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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXXI. No. 3246.] LONDON, JULY 29, 1925. [77TH YEAR. PRICE 1s.

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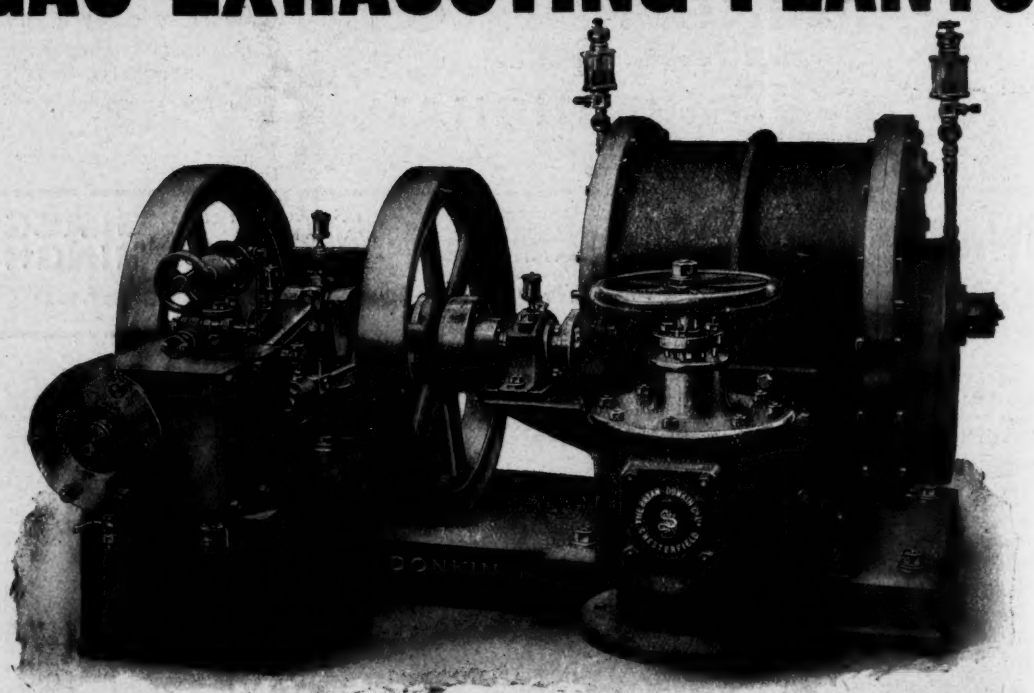

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VOL. CLXXI., No. 3246.] WEDNESDAY, JULY 29, 1925. [77TH YEAR.

EDITORIAL NOTES.

A Perilous Coal Position.

THE situation in the coal dispute changes with such rapidity that there is danger in attempting to say anything definite about it until something positive and conclusive occurs; but, generally speaking, the position before going to press may be summed up thus: In two days' time, the national agreement which regulates wages in the mining industry will come to an end. The grave decision was arrived at by the Executive of the Miners' Federation last Friday to issue instructions to the miners to cease work on that day. There is no doubt that this determination (which was agreeable to the extremists of the Federation) derived stimulus in the first place from the promises of whole-hearted support in a struggle, should one come about, from the Trade Union Congress and the Transport Workers' and Coal Porters' Union. But following the decision, a letter was sent to the Government from the Trade Union Congress Sub-Committee, who believed "it was the duty of the Government to take action without delay with the view to bring about an unconditional conference" between the coal owners and the miners' representatives. A communication was also addressed by the same Committee to the Prime Minister, offering to meet him; and the interview took place on Monday. Reading between the lines, it is clear that there are pacifists on the Trade Union Congress Committee as well as ultraists; and, while promising support to the Miners' Federation, they are, in view of the labour conditions in the country, more eager for a settlement than for contributing to bringing about a disaster of the first magnitude—not only for the country, but for the trade unions and their constituents generally. Immediately the ultimatum (shall we call it?) of the Miners' Federation was issued, the Government, through Mr. Bridgeman, again got into action; and probably at the same time the communication to the Government from the Trade Union Congress Sub-Committee had a mollifying effect upon the militant section of the Executive of the Miners' Federation. So it came about that during Friday Mr. Bridgeman had an interview with the representatives of both parties; and, under his chairmanship, there was a short combined meeting in the afternoon, and an arrangement for a further joint conference to-day. Upon this all eyes will be directed, as so much depends upon it as to what is going to happen on Friday. Unless something favourable to peace then definitely occurs it is hardly possible for a stoppage of the mines to be averted, other than by a suspension of the notice by the owners and the new terms posted in the various districts. We hope for the best. But should unfortunately the catastrophe of a strike come about, it is impossible to say whether it will be short-lived, or whether the support the miners will obtain will enable them to hold out for a considerable length of time. Anyway, unless wise counsels prevail, it certainly will be a case of winning by endurance. Luckily for the country the stoppage (if there is to be one) will come in the summer time; and, exports having been on the low side, stocks of coal in the country are good, with a large part of the accumulations at the collieries already in possession of the various industries—the gas industry among them. In the course of the inquiry by the Government Committee last week, it was elicited that the stocks of coal here at the end of 1924 were 9 to 10 million tons more than at the end of 1923, and they are now greater still. But regarding stocks, the railway and transport men have determined that they shall not be moved when once the pits stop work, though other industries and other workers may urgently need them! Comment on that decision could only be of an uncomplimentary character, and so we will leave it at that.

Glancing over the earlier events of the past week, the decision to bring about the stoppage came towards the end of a week in which the newspapers had spoken hopefully, and had referred to the outlook being brighter. It was at the beginning of the week that the Government Court of Inquiry, before which the Miners' Federation refused to appear, were endeavouring to clarify the position, and suggestions were made to the miners' leaders by the Government which it was hoped would lead to the owners and the miners' representatives being brought once more into contact with a view to resuming negotiations. Among the points which gave rise to the hope was that at the Court of Inquiry the Chairman, the Rt. Hon. H. P. Macmillan, K.C., had expressed the view that the construction which had been placed on the word "withdrawal" in the condition of the Miners' Federation to meet the owners again in open conference was the stumbling-block to the reopening of negotiations. But subsequent events indicated that there had been no ambiguity in the minds of the miners' leaders as to what they meant; and apparently the interpretation put on the word by Mr. Macmillan did not coincide with their intention. What they desired was that the owners should entirely withdraw their proposals as to wages; "withdrawal" meaning a complete abandonment of them, and starting *de novo*. The owners reviewed their position, and made an offer of a free and open conference; and it was hoped that this would be accepted, and would go a long way towards clearing away the differences between the parties arising out of the Miners' Federation's demand for the "withdrawal" of the owners' proposals as a condition precedent to a renewal of conference. The uncompromising attitude of the Executive of the Miners' Federation continued; and they showed no practical desire to put an end to the impasse. The reply which they gave to all overtures for a reopening of negotiations was to the effect that no misunderstanding existed in their minds regarding the situation or the meaning of the terms they had used, and that they would not re-enter into negotiations until there was a complete withdrawal of the owners' proposals. Coincidently with their decision to issue instructions for a stoppage on Friday, the Federation made it clear that they have been assiduously preparing for an immediate stoppage. An intimation was sent to all the districts that they must act as a whole, and that there must be no breaking-away of individual mines or districts. In fact, it was perfectly clear that the preparations for a stoppage were complete. But the Executive of the Federation came to certain prudent decisions. They were that the necessary safety men should be allowed to continue at work, provided that the rates of wages and conditions of employment were not less favourable than those obtaining in July; that it should be left to the districts to agree as to the number of men required to carry on the work—that is, enginemen, pump men, ostlers for feeding the ponies, coking plant and boiler men, and other necessary work. But in the event of a stoppage, it is understood that there is to be no production of coal or coke. Subsequent events are referred to in the first paragraph of this article. All eyes are now fixed upon to-day's meeting. What will it bring forth?

Regarding Coal Prices.

Should the coalowners interest themselves as to what happens to coal after it leaves the pits—that is, so far as it affects the price to the consumer? The point was raised at the inquiry into the coal dispute by the Government Committee—the Right Hon. H. P. Macmillan, K.C., Sir Josiah Stamp, and Mr. W. Sherwood—at which unfortunately the Miners' Federation were not represented. Mr. Evan Williams, the President of the Mining Association, had stated that the wage costs amounted to 72 p.ct. of the total costs of coal production; and this led to a comparison of household coal prices at the pithead with the prices charged by retailers in London. This caused Mr. Williams to say that the distribution of coal after it left the pithead was no concern of the Mining Association. Of course, it does concern them, because the cost delivered to the consumer must influence the demand at the pithead. As a matter of fact, the Mining Association have on various occasions taken good part in bringing about discussion of the question of railway rates for coal and coke; and they have thrown their weight on the side of the industries of the country in securing reductions from the railway companies. Whether those reductions have been in any way commensurate with those which the railway companies have received in the price of locomotive fuel is not known; but later in the inquiry the Secretary of the Mining Association (Mr. W. A. Lee) stated that up to two or three months ago the average increase in the price of locomotive coal was between 50 and 60 p.ct. above the 1913 price. Since then there has been a reduction of price which has brought the increase down to about 30 p.ct. The railway companies appear to be highly favoured; but Mr. Lee does not think they have ever said to the coalowners: "If you reduce "the price of coal, we will reduce our railway rates for "coal." Perhaps the further reduction in locomotive fuel will be noted by those who think the rates for the conveyance of coal and coke are still too high.

Of course, in regard to those industries which buy coal at the pithead and themselves arrange for its transport, the coal owners cannot have any concern in the future of the coal after it leaves the colliery; it is only in cases in which others come between the collieries and consumer where the owners could possibly become concerned in the after-happenings to the coal which would affect the measure of consumption. Nor can they have any influence in regard to coal purchased at the pithead for export. But the bald fact remains that the owners are face to face with the position that, even at recent prices, home buyers will not purchase more than they immediately want, and many purchasers abroad can get their requirements satisfied at a cheaper rate than that at which we can supply. In those facts the answer is found to a suggestion which, it was stated at the inquiry, has been made by Mr. Herbert Smith, the President of the Miners' Federation, that the owners are not getting for coal as high a price as they ought to do, and that they are selling coal too cheaply to the public services of this country, which are not competitive in any sense. The public services will be vastly interested in the idea of the Miners' Federation that they and the public whom they serve should be made the victims of the policy of less production per man-shift than that realized before the war. In making the suggestion attributed to him, Mr. Smith has overlooked the fact that the present condition of the industry is largely due to the loss of export trade; and, unless the coal owners can meet the competition they have encountered in every market across the seas, the export business will continue to dwindle, and the position will become much worse. We fail to see what reasoning can be applied to the suggestion that British industries, services, and the public should pay more for British coal than the foreigner. The whole suggestion is too absurd for argument. Furthermore, the competition of oil fuel with British coal is not negligible; and the loss of business with countries possessing water power is another factor in the situation.

Evidence was laid before the Committee which showed that contracts for coal have been lost because the prices are 6d. to 3s. per ton higher than prices abroad; and it is asserted that, if we could return to previous working hours, British mines would be able to sell at 2s. per ton less, and so regain the prosperity which has been lost. The position was put even more strongly in the statement that, if the mines could get back to the same output per man as in 1913, 2s. 6d. per ton on production could be saved, which could be used partly to stimulate consumption and partly to increase the wages fund. This shows that salvation for the industry is largely in the hands of the miners themselves. The power is theirs, but the leaders decline to let them use it.

Bitumen and Tar—An Official Announcement.

Welcome is given to the statement which has been forwarded to us by the River Pollution Committee of the Ministry of Agriculture and Fisheries regarding the use of bitumen and tar on, and in the construction of, roads. We welcome it because it is an act of justice to the gas and coking industries of the country; and it sets at rest once and for all any idea as to preferential recommendation on the part of the Committee for the universal use of imported bitumen, in place of home-produced tar. We should like to see this followed by a similarly positive pronouncement by the Ministry of Transport, and by a public withdrawal or denial by Sir Henry Maybury of the statement reported in "The Times," and to which Mr. D. Milne Watson took strong exception at the Institution luncheon. Such prououncement and such withdrawal or denial would round-off neatly the official statement by the River Pollution Committee; for it cannot be disputed that, through the singular course of action taken, a large amount of injury has been done to tar interests.

The River Pollution Committee, in their official notification, categorically state that they are not antagonistic to the use of tar in the preparation of road surfaces; and they are anxious to correct that impression. Their sole concern is with fisheries; and the extent of their advocacy is that on roads, the washings of which are likely to find their way directly into streams, dressings containing tar and tar products should be avoided. On such roads (which, they acknowledge, constitute but a small fraction of the roads of the country), bituminous dressings, which are innocuous to fish and their food, should be used. To those lengths of road, they ask Fishery Boards and other bodies charged with fishery interests to draw the attention of the road authorities. That is the only measure of protection they ask for or desire.

While writing on this subject, the hope may be expressed that all gas undertakings and coking plant owners will heartily support financially and by information the tar propaganda scheme which the National Gas Council have in hand, the beginning of which is the attractive road tar exhibit at the British Empire Exhibition. Any producers of tar who have not received information as to these propaganda proposals should communicate with the Joint Managers of the National Gas Council, No. 28, Grosvenor Gardens, S.W. 1.

In our "Correspondence" columns last week, there was a letter by "Motorist" which has this week evoked trenchant and informative replies from Mr. Herbert W. Robinson, of the Midland Tar Distillers, Ltd., and the British Road Tar Exhibit Committee. "Motorist" was writing about something of which he confessedly knew little; our correspondents in the present issue are writing of matters of which they know a great deal.

Hire Charges.

Now that municipalities running electricity undertakings have the power to hire-out electric appliances, a totally new form of competition has arisen for gas undertakings—not only in respect of the prices of current for heating and cooking purposes, but in regard to the hire rates for appliances. In view of the values supplied for a given sum by other agents for heating and cooking, electricity undertakings are compelled to furnish energy for these purposes at prices which are relatively low to those which are charged for lighting, and even then they are below the average of the total costs per unit, but above the costs of the equivalent heating values of other agents. To gain custom in these directions, expediency is the only justification which can be put forward for this state of things in regard to price; the incidence of the heating and cooking loads (if

they ever reach—shall we say?—the levels of the corresponding loads in gas supply) would not, without violation of the principles and formulæ long since adopted and at one time applied to charges for electricity, justify what is being done to-day. Now some municipal authorities are also charging low hire rates for electrical appliances. The Liverpool Corporation Electricity Department, for instance, are letting-out cookers on hire at 5s. per quarter. We know that electric cookers of reasonably good make—double cased, with hotplate and grill—cannot be purchased at prices less than (say) £15 to £25, and some makes, with larger ovens, run to very high figures. Poorer makes of cooker, with heavy heat losses, can be purchased for less. Supposing a cooker cost £15, 5s. a quarter would only produce £10 in ten years. We do not know the market value of the cookers used in Liverpool, but we are satisfied they cannot be up to much if they cost less than £15. In such circumstances, the rental paid would not in ten years provide, given a ten years' life, interest on capital and maintenance and renewal charges. It seems to us that in respect of hire charges there is a good deal of undercutting going on in municipal electricity departments, with a view to making more effective the competition with gas. Though that undercutting is not justified, the administrators of gas undertakings must consider it in relation to their own hire charges, and the maintenance of the interests of their undertakings. It is unfair competition. It may only be introductory; it may cease after a time. While, however, it prevails in certain electricity supply areas, it must not be neglected. There are, we know, some gas undertakings which err in the opposite direction. From time to time we hear of exorbitant hire rates for gas appliances—hire rates out of all harmony with the current prices of appliances. Consumers privately complain bitterly of the charges levied in some areas; and we do not blame them in instances to which our attention has been drawn. In these cases the hire rates are distinctly in need of substantial revision.

Sale of Incombustible Matter as Fuel.

THE Public Control Committee of the London County Council have, after a space of rather more than thirteen months, reported upon the reference to them as to whether or not the Council should seek authority in their next General Powers Bill to put an end to slate, slack, or any other incombustible matter being sold to the public as coal, or coal being sold of inferior quality to that ordered. We had hoped for a really effective report, which would do something to bring this question of the sale and distribution of incombustibles in coal prominently before Parliament, with a view to paving the way to the general practice of cleaning at the pithead, so as to prevent the uneconomies and inefficiencies which abound through the state in which many classes of coal are sent from the collieries. We know that what the London County Council could do in this matter is limited; but they are in a remarkably fine position for raising in Parliament the general subject of incombustibles in coal, when seeking to obtain legislation to stop the sale of an undue proportion in the coal supplied to the householders of London. We are afraid the report of the Committee does not carry us far; nor will the recommendations. The Committee have not in their considerations got beyond the coal merchants and retailers who vend the coal. These people, however, are largely the victims of what takes place at the collieries.

The Committee are under the impression that industrialists can safeguard themselves by specifying the quality of coal which they require, but that this cannot be done by the ordinary domestic consumer. Some of the reputable coal merchants and retailers do submit their coal to a certain amount of screening; but if the work is done at the pit, there would be no need to incur the expense of conveying by rail or boat and otherwise handling the slate and other incombustible material which is contained in the coal delivered to London, or the cost of removing it by hand. There is, however, in coal a good deal of incombustible matter which cannot be dealt with so simply, but which could be in large part removed by proper treatment at the collieries. Distinct from slate, there are incombustibles such as ash, and this is in many coals today in "undue proportion" for the existence of a healthy condition of things. But these are impurities which cannot well be determined by, or known to, the coal merchant and retailer. They must be dealt with at the colliery. Few coal merchants and retailers are in a position to indulge in laboratory tests to ascertain the proportion of ash, moisture, and other incombustibles in the coal, and certainly domestic consumers are not capable of doing so. This is a matter which really requires to be dealt with at the source, and not after much of the mischief has been done through the distribution of an inordinate amount of incombustibles in the coal. But the Committee want to give the domestic buyer protection against the condition of purchasing something as coal which is useless from the thermal point of view, and redress if he is defrauded in that way. They therefore recommend that application be made to Parliament next session to provide that it shall not be lawful for any seller or dealer to vend coal containing an "undue proportion" of slate, slack, or incombustible matter, and that, if any person contravenes this, he shall be liable to a fine not exceeding £10. It is also recommended that power be obtained to enable the Council to make, vary, and amend by-laws with respect to coal containing an "undue proportion" of slate, slack, or incombustible matter.

We are afraid the Council are taking upon themselves something which is beyond their compass. We see that the question of whether the "proportion" of incombustible matter is or is not "undue" would have to be dealt with by the magistrate on the facts of each case. We pity the magistrates. In fairness to everybody concerned, there should be standards set up for different grades of coals. Otherwise, how is the coal merchant or retailer to be protected? He must have some standard which he can have applied as a guarantee when he is purchasing the coal, so that he can recover from the source of his supplies any penalties which he may suffer in the event of the coal being found to contain an excess of incombustibles. We want to see cleaner coal everywhere; but it seems to us that the limited proposals of the Public Control Committee of the London County Council will only lead to complication and difficulty. To be of any use, something much more definite is needed.

Bitumen and Tar.

In the "Correspondence" columns of "The Times" Mr. A. E. Collins, of Norwich, Past-President of the Institution of Municipal and County Engineers, asserts that the difficulty experienced during the recent hot weather has been largely in connection with roads dressed with bitumen, and not with tar. He makes this explanation: An advantage claimed for bitumen, or more correctly in many cases petroleum residue, is that it hardens soon after application to the road, which fact is really a disadvantage in that it prevents penetration of the road surface, and the material remains as a cover which, when softened by hot weather, is easily peeled off by traffic. Tar, on the other hand, when properly prepared for road purposes, gives a hard, durable, non-skid surface. A tarred road is shown in the Chemical Section of the Palace of Industry at Wembley; and although laid in hot weather, it was sufficiently hard for traffic almost immediately after completion, and has remained as hard as a rock in spite of the intense heat to which it is subject. An editorial article on the matter appears in an earlier column, and letters in our "Correspondence."

Gas Mantles and Superphosphates.

It is stated that the reports containing the findings of certain Committees relating to the applications for import duties are in the hands of the President of the Board of Trade (Sir Philip Cunliffe-Lister), and that the report of the Committee who have been inquiring into a duty being imposed on foreign gas mantles will be presented almost immediately. It is understood, but this must not be taken as definite, that the report of the Committee on superphosphates is adverse to the placing of a duty on imports, on the ground of the needs of agriculture in this country; and, in view of the fact that the season is approaching when farmers make their contracts for supplies of fertilizers, the publication of this report will probably be promptly made.

Moisture in Coke and Legislation.

A year ago, the London County Council decided to approach the Board of Trade with a view to securing the introduction of legislation dealing with the sale of coke. Since then a series of experiments has been carried out by the Council's officers with a view to determining the amount of water present in coke in excess of the natural moisture retained in a normal atmosphere. The coke was purchased in the ordinary way of retail trade in quantities of 28 lbs., on five different days, from eleven of the London Gas Companies' depots. Apart from three samples, all purchases were made on dry days, when there had been no rain for at least 24 hours. The coke when purchased was carried direct to the County Hall, and samples varying from 11 to 15 lbs. were taken from the middle of each quantity, and placed in open baskets in a laboratory in the basement, where they were free from interference or other adverse conditions. Weighings took place at regular intervals to determine the loss of weight due to the evaporation of the water in the coke, the temperature of the room varying from 57° to 65° Fahr. The period during which the samples continued to lose weight varied from three to eight weeks; evaporation being noticeably more rapid on some days than on others. The three samples obtained on a wet day did not contain any greater quantity of water than those taken on dry days. Observations, carried out during a period of four weeks, showed that the samples of coke supplied by three Companies sustained an average loss of weight of 18·6 p.ct., 13·8 p.ct., and 6·6 p.ct. respectively. The Public Control Committee of the Council have forwarded particulars of the experiments to the Board of Trade for consideration in connection with any legislation.

The Dirtiest City.

Mr. John B. C. Kershaw, F.I.C., has been writing in the "Newcastle Chronicle" on "The Dirtiest City;" and, on the evidence of the Tenth Report of the Advisory Committee on Air Pollution, Newcastle can claim the distinction. The fault does not rest with the local Gas Company; for their propaganda work and enterprise are second to none. Having examined the figures, Mr. Kershaw concludes his article by saying that the high figures for the Newcastle deposit of tar and carbonaceous matter in the 1923-4 returns lead him to believe that it is not the factories and shipyards, but the shipping in the river and docks and the domestic chimney which are responsible for the large portion of the dirt and soot in Newcastle's atmosphere. If this surmise be correct, then the remedy, he says, can only come by the spread of more exact knowledge of the principles of combustion, and by greater use of gas and coke for domestic purposes.

Half-Year's Coal Exports.

With the returns relating to the export of coal during June, the half-year's statistics have been completed. It is some time since there was a half-year like it. In June, the shipments of coal of all kinds amounted to 3,733,845 tons, which compares with 4,882,291 tons in June, 1924, and 6,588,651 tons in June, 1923. The values were: June this year, £3,768,521; June, 1924, £5,728,045; June, 1923, £8,950,779. During the month the quantity of gas coal exported was 484,804 tons, the value of which is returned as £455,494, which averages out to 18s. 9·5d. per ton. In June, 1924, the gas coal exported was 769,346 tons, of a value of £882,101; and the quantity in June, 1923, was 725,195 tons, of a value of £924,885. These figures show the considerable decline in the demand for gas coals for use abroad. Taking the whole of the six months, the total exports of coal of all sorts amounted to 25,848,443 tons, as against 31,131,057 tons in the six months of 1924, and 39,808,881 tons in the first half of 1923. The values of these three quantities were: 1925, £26,912,336; 1924, £38,002,992; 1923, £50,415,430. The gas coal shipped in the six months only totals to 3,422,795 tons; the value being £3,389,518. In the six months of 1924, the gas coal shipped amounted to 4,211,932 tons, of a value of £5,032,570. In the corresponding period of 1923, the gas coal exported reached 4,648,214 tons, the value of which was £5,629,505.

Gas Coke Shipments.

In June the shipments of gas coke only aggregated 15,840 tons, which compares with 34,625 tons in June, 1924, and 59,997 tons in June, 1923. The value of the 15,840 tons last month was £14,529, which averages 18s. 4·1d. per ton. This is a serious drop from the prices which ruled two or three years ago—in fact, the value is now below the per ton average of the exported gas coal. The value returned for June, 1924, was £61,662, and for June, 1923, £96,788. In the six months the total quantity of gas coke sold abroad was only equal to about half the amount exported in the first half of 1924. The figure for last half-year was 224,814 tons, while in the first half of 1924 it was 442,717 tons, and in the first six months of 1923, 505,768 tons. The values during the six months of the three years were: 1925, £318,466; 1924, £776,735; 1923, £764,220.

Sulphate of Ammonia.

During June the quantity of sulphate of ammonia sent overseas was 19,575 tons, compared with 17,024 tons in June, 1924. In the six months the shipments were only less than those of the first half of 1924 by 510 tons; the actual figures being for the last six months 134,039 tons, as against 134,549 tons in the first half of 1924. Spain and the Canaries continue to be our best customers; the shipments to those quarters in the half-year having been 62,641 tons, as compared with 37,597 tons in the first six months of 1924. Japan, with 18,580 tons, qualifies as our next largest customer; but the patronage is a considerable drop from the 41,021 tons sold to that country in the first half of 1924. The Dutch East Indies have maintained their custom by taking 15,334 tons in the half-year, compared with 15,353 tons in the June half of 1924.

Coal Tar Products.

The selling of benzole abroad has this year diminished considerably. In June, only 916 gallons were exported, compared with 275,540 gallons in June, 1924. In the half-year, the exports of benzole were 137,884 gallons, as compared with 826,634 gallons in the first half of 1924. Naphtha has also been a poor selling product abroad. In June this year, only 3727 gallons were shipped, as against 6496 gallons in June, 1924. In the half-year, 25,541 gallons of naphtha were sold abroad, as compared with 144,811 gallons in the June half of 1924. Amalgamating tar, oil, creosote, &c., it is seen that 4,687,822 gallons were exported last month, as against 2,092,392 gallons in June, 1924. In the six months, a better business in these products was done abroad than in the corresponding period of 1924; the total for the half-year having been 20,849,689 gallons, as against 18,769,196 gallons in the June half of 1924.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 3-4.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual general meeting at Dunfermline.
Sept. 8.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board.
Sept. 14-16.—INSTITUTION OF PUBLIC LIGHTING ENGINEERS.—Second annual meeting and conference at Leeds.
Sept. 15-17.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual meeting in Belfast.
Oct. 19-21.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual conference and general meeting in Plymouth.

INSTITUTION OF GAS ENGINEERS.

Sept. 7.—2.30 p.m., Emergency Committee. 3.30 p.m., Finance Committee.
Sept. 8.—4.0 p.m., Advisory Committee on Education.
Oct. 13.—4.0 p.m., Consultative Committee of the Education Scheme, followed by meeting of the Advisory Committee.
Oct. 22 (provisional).—2.30 p.m., Emergency Committee. 3.15 p.m., Finance Committee. 3.45 p.m., Council Meeting.
Nov. 10.—4 p.m., Advisory Committee on Education.
Nov. 11.—11.30 a.m., Emergency Committee. 12.15 p.m., Benevolent Fund Committee of Management. 12.45 p.m., Finance Committee.
Nov. 25.—11 a.m., Institution's session at the Public Works, Roads, and Transport Congress.
Dec. 2.—Official visit to the Shipping Engineering and Machinery Exhibition at Olympia.
Dec. 8.—4 p.m., Advisory Committee on Education.
Dec. 9.—11.30 a.m., Emergency Committee. 12.30 p.m., Finance Committee.

PERSONAL.

On medical advice, Sir ALFRED MOND, Bart., M.P., who is President of the Society of British Gas Industries, has cancelled all his engagements until September, and has gone abroad.

The latest list of new members of the Society of Chemical Industry includes the name of Mr. JOHN BOYD, Chemist, Corporation Gas-Works, Rothesay, Bute.

ELECTRICITY SUPPLY MEMORANDA.

AN extremely interesting article by Mr. E. W. Dickinson, M.I.E.E., on "The Use of Gas Coke for Raising Steam" has appeared in the "Electrical Review;" and it is a perfectly disinterested statement as to the position of this fuel for the purpose of steam-raising for electrical stations. We ought to say that the gas industry cannot, and does not, expect, and it would not happen, that coke or breeze should be used in any manner by electrical engineers unless there are material advantages to justify it. We therefore agree entirely with a suggestion by Mr. Dickinson that the conservation of the national fuel resources would not alone be a sufficient justification for the use of coke by them; but its employment must be attended by economy and efficiency. Mr. E. W. L. Nicol has shown on many occasions that there are benefits of a tangible order to be derived from the use of coke for steam-raising, and it is good to have from Mr. Dickinson independent testimony which proves that electrical engineers can patronize coke or breeze with direct advantage, and at the same time the patronage will help in the conservation of coal. In this way, too, they can do much to mitigate the charge that their utilization of coal is destructive of the valuable properties—even much of the thermal energy—contained in it. Mr. Dickinson first presents the characteristics of a coke having a calorific value (dry) of 12,550 B.Th.U. per lb., or 11,480 B.Th.U. as received, or net 11,370 B.Th.U. He then discusses the advantages and disadvantages of coke as a fuel for steam-boilers. In the first place, steam-raising coal, as a rule, contains about 30 p.ct. of volatile matter, while modern gas coke retains only about 1·5 to 2½ p.ct. We think the day will come when the structure of coke will be causing the electrical engineer as much interest as the volatile matter. However, Mr. Dickinson says the low percentage of volatile matter is both a disadvantage and an advantage. He explains that the disadvantage, using coke alone, arises from the fact that the volatile matter in the raw coal, properly burned, forms a quick and easy means of keeping the furnace brickwork at the required temperature level for igniting the constantly incoming fuel. On the other hand, provided ignition difficulties are overcome, absence of hydrocarbons in coke eliminates one of the chief troubles of fuel combustion. It is a constant problem of the combustion engineer so to regulate the air supply as to obtain intimate contact throughout between the oxygen of the air and the hydrocarbons. He must not, however, overdo it, and bring down with excess air both his CO_2 and his furnace temperature. This difficulty, when coke is burned alone, being surmounted, very high CO_2 readings are obtainable, with resultant good evaporation.

Coke and Independent Testimony.

Mr. Dickinson has had a large experience, dating from 1916, with coke utilization; and his working and experiments finally led him to adopt the Sandwich system, the use of which cleared away all traces of the ignition difficulty, and minimized the loss of unburned carbon in the ash. The dual-fuel system, however, introduced the need for double shoots to each boiler hopper, with consequent capital expenditure. The problem was thus brought to the commercial issue of an offer for coke at such a price as would cover the cost of breaking, bunkering, and any extra repairs and maintenance due to abrasion which might take place—thus justifying the extra capital expenditure. In a case under review in the article, this expense was estimated to be covered by an addition of 7½ to 10 p.ct. to the then market price of coke. Orders were placed and definite economies ensued. As is pointed out, the system has introduced a new line of thought in fuel combustion, since not only coal and coke, but coals of varying thermal values and physical properties may be blended, to the advantage of both the commercial and the national interests. By trial, some advantageous mixture, having regard to market prices, stocks, and other factors, is soon determined, bringing into relief the elasticity of such a system when backed by a suitably divided bunker, shoots, and hoppers. Later on in the article the saving to be expected by using a combination of coal and coke on the Sandwich system is gauged by taking an example. It is assumed that the grates are run on natural draught. An offer of coke, delivered free, is obtainable at 17s. 6d. per ton. The cost of evaporating 1000 gallons of water would with this be 13·4s. Northumberland smalls, costing 22s. per ton, are also being burned; giving a cost of 16·7s. per 1000 gallons evaporated. Thus the cost would be 13·4s. + 16·7s. ÷ 2 = 15·05s. per 1000 gallons. Compared with 16·7s., this shows a saving of upwards of 6 p.ct. Even if forced draught stokers were available, and coke could thereby be burned alone, the saving would not be so great. Concluding his interesting article, Mr. Dickinson says it may be safely stated that, by a wise selection of fuel from a field thus extended by the introduction of another class of fuel in the form of coke and coke breeze, with the expenditure of a reasonable sum for shoots, &c., many undertakings would derive benefit through lowered cost of power production. It also places the nation's fuel resources in a more favourable position than heretofore; and at the same time gas and the valuable bye-products are recovered and distributed. Coming from Mr. Dickinson—a perfectly disinterested authority—the article (which occupies rather more than four columns in our contemporary) should have valuable influence among electrical engineers, as it shows a way of securing a material economy per ton of fuel. There are other advantages upon which the author does not comment—such as the reduction of smoke by the use of coal smalls on a bed of coke; and the fact that with the Sandwich system a more porous bed is obtained, and thus more complete combustion—enhancing the duty of the boiler.

Value of the Sandwich System.

It was seen at the recent meeting of the Incorporated Municipal Electrical Association that a feature of present electrical propaganda is to urge householders to adopt electricity for the domestic purposes of cooking and heating, in order themselves to help to reduce the selling cost of the current. It is said that this, combined with the ability to adopt more efficient plant at the generating station with the increase of demand, will make a material difference to the patrons of electricity stations. This is plausible enough; but examination of the matter does not support the represented substantial economy to the consumer. The cost of wiring houses and the expenditure on electrical appliances are a first consideration; and a KW.-H. only possessing a potential thermal value of 3412 B.Th.U. (this is the now accepted figure), makes the current an extraordinarily dear heating agent, as compared with other means of doing the same work. Notwithstanding the boasted efficiency of the electric fire, which efficiency is not that of the electric oven, and much less of the electric hotplate, there is a good deal of misleading information being circulated regarding domestic electrification. We are also of opinion that, assuming a big success, the intermittent domestic use of electricity in the daytime, with new peaks being formed at various times of the day—particularly in the winter months when heating requirements are as vagarious as they can possibly be through the erratic temperatures in this climate of ours—will not affect in the gracious manner suggested the capital and distribution costs which form per unit such a large part of the total outgoings of an electricity undertaking. There must, in the circumstances of the electricity industry, should this line of business develop to any considerable extent, come a point at which economies will cease, and higher expenditures have to be incurred, in order to comply with the demand. It is not the same as in the case of a gas undertaking where large gasholders and water-gas plants enable almost any possible flight of demand in a district to be met without difficulty.

Householders Urged to Help to Reduce Prices.

The points in the foregoing paragraph are suggested by the publicity which has been given in the Liverpool papers to the opening of new showrooms for the Corporation Electricity Department. The occasion has been used—and properly—for boosting the domestic applications of electricity; but great use is being made of the point that householders, by increasing their domestic demand for electricity in the daytime, will render assistance in bringing about lower charges for current. Of course, electrical men have been aware of this for a number of decades past; but their spasmodic attempts to increase the day load, apart from industrial power, have not hitherto, through encumbering difficulties, met with any great success. On every occasion that endeavours are made, there is a limited flight of success, and then practical experience produces a pause, and little is heard of advances in these directions until a fresh effort is again made. The Corporation Electricity Department are at the moment dangling the two-part system of charging before the householders. In their case the fixed charge is 20 p.ct. up to £100 rateable value, and 10 p.ct. above that figure, *plus* ½d. per unit consumed for any purpose. It is obvious how unfairly this would work in the case (say) of a man who, occupying a house rated at £50, was through his circumstances as large a consumer of current as the man who occupied a £100 house, but whose requirements did not exceed those of the other householder. In the case of the tenant of the house rated at £100, he would be paying 20 p.ct. on £50 more than the other man for an equivalent service. That is unfair. Another submission in the propaganda is that, if consumers would make full use of electricity for lighting, heating, cooking, ironing, cleaning, &c., the average cost would be brought down to (say) 1d. per unit, and

The Case of Liverpool.

probably less, as compared with 4·3d. per unit for lighting alone. Experience we think will, if history repeats itself (as it generally does), prove to the consumer that there are other considerations for them besides the one of cost of current; and, even at the charges named, the domestic expenditure would be considerably more than for other agents *for equal service*. It is stated that the Corporation have fourteen small houses with only coal heating in the kitchen and for the boiler for bath purposes; and it is stated that the experiences of the tenants have been quite satisfactory. We have heard much the same tale on previous occasions regarding similar experiments in other towns. Subsequently there have been introductions of gas boiling rings, replacements of electric heaters by gas fires, and even the installation of gas cookers where tenants' experiences have been far from what could be called "satisfactory." We see too that in Liverpool the Housing Committee are contemplating the erection of 250 houses of a like character; and it is stated that it is possible these will be on the basis of only one coal grate—the remaining rooms being all electrically fitted. Utility and cost, it is averred, are to be the bases of the verdict; but it is understood that the Corporation are not prepared to proceed indiscriminately with spending capital for fitting up houses in this manner. It is also observed that the Corporation Electricity Committee flatter themselves on having out on hire 800 electrical cookers at 5s. per quarter. Having regard to the density of the population in the area of electricity supply, 800 electric cookers is a very small number. The 5s. is an extraordinarily low charge for hire, but, of course, it is nothing more or less than a bait at the initial stages of this business.

Money for Advertising.

The Electrical Development Association have very large views on the subject of the proportion of the revenue of the electricity undertakings of the country which should be devoted to advertising and publicity. Apparently their ideas are based on the up-hill work which the electricity industry has before it in attempting to cultivate a material load from domestic requirements other than for lighting. We see this in a paper which Mr. V. W. Dale, who is connected with the Association, read at the British Advertising Convention at Harrogate recently. In the course of it he expressed the opinion that electricity undertakings should spend on advertising and publicity not less than 2 p.ct. of their revenue. The yield on this basis would last year have been well over £600,000. This is his idea of what should be the outlay on advertising electricity; but he is somewhat doubtful as to whether more than one-tenth part of that sum was actually spent on propaganda. Mr. Dale, there is no question, has a very clear conception of the actualities of the situation. He tells us that all the people require is light, heat, or power; but these services can be obtained from other sources, which means constant active competition, and therefore the need for permanent educational advertising. Among the things which has astonished him is that, in districts where more than one price prevails for electrical energy, people have not been aware of the fact, simply because the municipalities administering the supply merely "announce" the information, but do not "advertise" it. He is struck by the fact that many undertakings serving communities of a million or more people, and offering electricity at rates which reflect the application of the highest technical and engineering skill and generous financial policy, very often have a poor appreciation of the power of publicity. In his opinion, their income could in many cases be increased to from two to five fold. With, last year, a consumption of electricity in this country amounting to 5,000,000,000 KW.-H., this represents approximately only 130 KW.-H. per head of population. The revenue last year was of the order of £33,000,000, or about ½d. per day per head of the population. The figures, Mr. Dale points out, indicate the wonderful scope there is for expansion; but we have no doubt that he has in mind, even if he does not make prominent allusion to the fact, that a multitude of gas cookers, gas fires, water heaters, &c., are blocking the road to expansion. He further points out that there are 10,000,000 to 11,000,000 houses in these islands, and less than 12 p.ct. of them are wired or using electricity at present for any purpose. Notwithstanding this, the service of electricity is already available to 74 p.ct. of the population. This is all interesting information.

Gas Light and Coke Company's Dividend.—The Directors of the Gas Light and Coke Company have declared dividends for the half-year ended June 30 last as follows: On the 4 p.ct. consolidated preference stock, at the rate of 4 p.ct. per annum; on the 3½ p.ct. maximum stock, at the rate of 3½ p.ct. per annum; and on the ordinary stock, at the rate of £5 6s. 8d. p.ct. per annum.

Commercial Gas Company's Dividend.—The Directors of the Commercial Gas Company have declared dividends for the half-year ended June 30, 1925, at the rates of £5 6s. 8d. p.ct. per annum on the 4 p.ct. capital stock and £5 3s. 4d. p.ct. per annum on the 3½ p.ct. capital stock (both less income-tax), payable on Aug. 15. The dividends are 8s. p.ct. per annum and 10s. p.ct. per annum less than the amount paid for the previous half-year on the respective stocks.

AUTOCLAVES AND HIGH-PRESSURE WORK.*

Reviewed by W. H. HOFFERT, M.A., B.Sc.

This book is one of a series of practical text-books on Chemical Engineering. Each book of the series deals with a specific section of this branch of technical chemistry, and is written by a specialist in the particular subject. The volume under consideration treats of the construction of and methods of operating autoclaves from the small laboratory type to the large-scale plant, and is written essentially from the practical point of view.

The first part of the book on laboratory autoclaves fulfils the aim of the author, in giving concisely just that practical knowledge which the research chemist coming fresh to this branch of technical science requires, and should enable him to avoid the pitfalls over which it is very easy to come to grief. Chapter 1, which is of an introductory nature, gives particulars which apply to autoclaves in general. This chapter might, perhaps, for the sake of completeness, have included a fuller theoretical discussion of the reasons for carrying out certain reactions under pressure.

Chapters 2 and 3 furnish details of the construction of laboratory autoclaves of various types and of different forms of stirring gear, as well as practical details of heating and operation, with examples. The rotating autoclave, with or without metal balls, pebbles, or other form of internal packing to promote stirring, has not been mentioned. This type of autoclave is useful for many purposes where the stirring required is not of too rigorous a nature, since it enables the contents of the autoclave to be mixed at high pressures without any of the difficulties usually connected with the stuffing box. Doubt is expressed as to whether a liner is really a necessity where there is no possibility of chemical action between the charge and the material of the autoclave. In this connection, it might be pointed out that not only the resistance to corrosion of the material of the autoclave, but also the possibility of the metal walls acting catalytically, has to be considered.

The remainder of the book (Chapters 4 to 9) deals with the construction, operation, and methods of heating of semi-large-scale autoclaves to the full-scale works autoclave, and concludes with a chapter on the routine running of large-scale plant. In view of the many processes in which high pressures are now used, the present volume forms a welcome introduction to this branch of chemical engineering; and the author is to be congratulated on producing a book of practical value to all those interested in autoclave work, where the reaction is carried out intermittently under pressure in the liquid phase.

Since the book is entirely devoted to this branch of high-pressure work, the title of the volume is a little misleading. A future volume of the series might well be devoted to plant for conducting reactions continuously under pressure in the liquid and also in the gaseous phases.

* "Autoclaves and High-Pressure Work," by Harold Goodwin, M.Sc. The Chemical Engineering Library (Second Series). Pp. 166. London: Ernest Benn, Ltd., 1925. Price, 6s.

BITUMEN AND TAR.

The Rivers Pollution Committee Explain.

The following official statement explaining their attitude towards the subject of rivers and road tar pollution has been issued by the River Pollution Committee of the Ministry of Agriculture and Fisheries.

The River Pollution Committee of the Ministry of Agriculture and Fisheries, having been informed that the impression prevails in many quarters that the Committee is antagonistic to the use of tar in the preparation of road surfaces, is anxious to correct this impression. The Committee is concerned solely with the question of the pollution of rivers from the standpoint of the fishery interest; and, as it has been proved that the constituents of tar, if they find access to a river, are most injurious to fish and their food, the Committee earnestly advocates the avoidance of the use, on any road the washings from which are likely to find their way directly into a stream, of any road-dressing containing tar or tar products. As it has also been proved that washings from bituminous surfaces are innocuous to fish and their food, the Committee has advocated the use, on roads in proximity to streams, of bituminous dressings. Obviously, the roads with which the Committee is concerned constitute only a small fraction of the total roads of the country.

It is no part of the Committee's policy either to advocate the general use of bitumen or to deprecate the use of tar, or of any other particular material, on road surfaces remote from streams, nor has it ever done so; but it considers it reasonable to urge upon all road authorities that care should be taken to avoid the use of tar at what are the danger points from the point of view of pollution. The Committee also urges the fishery boards and other bodies charged with fishery interests throughout the country to draw the attention of the road authorities to those lengths of road upon which, owing to their

proximity to streams, the use of tar ought to be avoided. The Committee is confident that it can rely upon the co-operation of the road authorities with the fishery boards in securing this measure of protection for fish and their food.

The Committee has examined a number of preparations for road-surfacing, and is prepared, if consulted by road authorities or other persons concerned, to advise them as to the suitability for use in proximity to streams of such preparations as have been examined.

TAR FOR ROADS.

Points Raised at the Meeting of the Institution of Chemical Engineers.

During one of the discussions on stream pollution at the recent meeting in Leeds of the Institution of Chemical Engineers, some remarks with regard to rivers were made by Dr. Nurse, of the Government Laboratory, from the fishery point of view.

These led Dr. E. W. Smith to ask if the speaker could give any information as to the position with reference to the so-called contamination of streams from road tar. Was road tar really a serious menace to fish life, and if so was it due to the soluble constituents of the tar that got into the streams, or was it due to the film that spread over the water and prevented the fish from getting oxygen? Further, could he state what percentage of roads which were treated with tar were in connection with streams? Vested interests were trying to make the point that tarred roads were a real menace to fish life in streams; but it occurred to him that a very small proportion of the tarred roads had any possible connection with streams.

In reply, Dr. Nurse pointed to the fact that the Committee set-up three or four years ago—a Joint Committee of the Ministry of Transport and the Ministry of Agriculture—to investigate the specific question of the effect of tarred roads on streams came to the conclusion that it was possible for tar to become dangerous to fisheries under certain conditions. The two conditions were: First, when the tar was laid on and rain fell upon it before it was thoroughly set and dry; and, secondly, when the road had been in use for some time and had reached its breaking-up point, and through the action of frost and traffic the road surface became disintegrated and washed into the streams as a fine silt, carrying particles of tar with it. In these conditions the Committee had evidence that it was possible for fish to be poisoned by the washings. The action of the tar was, as far as the Committee had found, practically a toxic one. He was unable to say the exact proportion of roads in the country where damage was likely to be done. In the interim report of the Committee to which he had referred—the final report had not yet been published—it was stated that it was advisable not to use tar where a road was in close proximity to fishing waters, and where the road drainage might be washed into streams. He did not think the Committee intended to condemn tar as a road dressing; but it certainly was liable to cause damage to fisheries in these key positions.

Sir Arthur Duckham expressed the opinion that in many cases the use of tar on roads had been criticized and damned because the tar was not properly treated before it went on to the roads. Frequently trout streams were in the neighbourhood of little towns or villages which had small gas-works, possibly with an absolutely non-technical man in charge; and the tar had been sent out for road purposes before being properly treated. If it had been treated at a suitable temperature before going out for road purposes, very many of the objections that had been raised as to the danger of tar to fisheries would have been eliminated. A considerable amount of work remained to be done before Government Departments should turn down tar as a method of road coating. At the present time there was a very strong movement in favour of bitumen; but people in this country felt they would like to buy as little bitumen from the United States as possible. They had to send enough money to the United States for other purposes, and would just as soon use their own product in this country, if they could possibly do so. It would be better for general trade if this were done.

Determining Gum-Forming Material in Gasoline.—According to a communication by Mr. M. B. Cooke, appearing in the "Journal of the Franklin Institute," an analytical method for the determination of the gum-forming material in gasoline has been developed by the United States Bureau of Mines, during a study now in progress to determine the best ways for the elimination of such constituents from gasoline. This method is similar in principle to one previously described, which involved evaporation of a sample of gasoline in a small glass dish. The evaporation was started on an actively boiling steam-bath, and completed in an air oven at 105° C. In the improved method, the steam-bath has been replaced by a steam-heated oven in which an inert atmosphere is maintained. Air is excluded from the oven, and consequently the precision of the determination is greatly increased. Furthermore, porcelain evaporating dishes may be used, whereas the former method was restricted to glass dishes.

GAS INDUSTRY EQUIPMENT IN MANCHESTER.

A special Manchester issue of the "Empire Mail" contains a great deal of information of general interest with regard to Britain's great inland port, as well as matter which makes a special appeal to readers of the "JOURNAL." This latter comprises descriptions of the works of West's Gas Improvement Company, Ltd., and of Messrs. R. & J. Dempster, Ltd., with particulars of the special types of plant manufactured in each, together with the following article on the gas-works equipment industry in Manchester.

In no country in the world is the gas industry more highly developed than in the British Isles; but in no city of the British Isles with the exception of Manchester can there be found great firms capable of undertaking between them the whole of the construction and equipment of a modern gas-works. The property of a modern gas undertaking may be separated into four main divisions. These, and their proportionate value, are as follows:

(1) Carbonizing plant, 18 p.ct.
(2) Purification and storage plant, 22 p.ct.
(3) Metering appliances, 23 p.ct.
(4) Distribution plant, mains, &c., 37 p.ct.

For the first division, comprising the retorts, furnaces, charging and discharging machinery, coal and coke handling plant, retort house and coal store buildings, coke screens, bunkers, storing, loading, and unloading machinery, we have the firm of West's Gas Improvement Company, Ltd., with their modern system of continuous carbonization in vertical retorts.

For the second division, which comprises apparatus for the cooling, washing, and scrubbing of the gas for the elimination of tar and ammonia, the dry purifiers for the extraction of sulphur compounds, and the gasholders for the storage of the gas, we have the firm of Messrs. R. & J. Dempster, Ltd.

For the third division, comprising the large meters used on the gas-works themselves, the governors which regulate the pressure of the gas distributed to the town, and the small meters found in the houses and premises of all consumers, we have the firm of Messrs. W. & B. Cowan.

The fourth division consists mainly of pipes and mains laid in the ground, which can be purchased, generally, in the neighbourhood of the gas-works themselves.

Thus Manchester is in a position to supply the whole of the equipment for a gas undertaking in any part of the world.

It is added that, since the introduction of the Glover-West system of vertical retorts in 1907, no fewer than 175 installations, comprising over 6000 vertical retorts of a daily gas-making capacity of 300 million c.ft. of gas, have been put into operation in the gas-works of many of the principal towns and cities at home and abroad.

As to Messrs. R. & J. Dempster, in the recently completed gasholder and boiler shop they are able to lay-out under cover gasholders up to 250 ft. in diameter. This shop is equipped with all the latest tools, many of which are specially designed for their work. A large fitting shop is now being constructed, and additional land has been obtained in order to cope with the work in hand.

GAS EXAMINATION PRIZE WINNERS.

Awards by the Society of British Gas Industries.

We have received from the Secretary of the Society of British Gas Industries (Mr. Arthur L. Griffith) the following list of winners of the prizes given by the Society in connection with the recent City and Guilds of London Institute Final Examinations in Gas-Works Practice, Gas Supply Practice, and Gas-fitting.

GAS-WORKS PRACTICE.

First Prize, 5 Guineas.

Alfred Thomas Challinor, examined at Burslem Technical School, Stoke-on-Trent.

Second Prize, 2 Guineas.

Lionel Saxby Agent, examined at the Technical College, East Ham.

GAS SUPPLY PRACTICE.

First Prize, 5 Guineas.

Lionel Poulter, examined at the L.C.C. Westminster Technical Institute.

Second Prize, 2 Guineas.

James Wilson Boyle, examined at the Royal Technical College, Glasgow.

GASFITTING.

First Prize, 5 Guineas.

Harold Ralph Mills, examined at the Gas Company's Offices, Exeter.

Second Prize, 2 Guineas.

Maitland Edward Ramplin, examined at the L.C.C. Westminster Technical Institute.

BRITISH ENGINEERING STANDARDS ASSOCIATION.

Membership Re-organization.

For some time past the Association have had under consideration the question of widening the scope and influence of their work; and the Main Committee have now decided to enlarge the membership, so as to enlist the active support and participation of all the great industries of the country. This will bring the Main Committee more closely in touch with industry, as the members are to be given direct representation on the Committee.

The new membership is to include professional engineers, industrial firms, and business men connected with all the great industries of the country, who are invited to become members at a minimum annual subscription of two guineas. Technical and trade organizations connected with the work of the Association, as well as public utility undertakings, are also eligible. The members of the Technical Committees, who give their time and experience to this national work without fee or recompense, and who now number some 2300, are in the future to be known as Honorary Members. All members will be entitled to certain privileges, including direct representation on the Main Committee through a duly elected Advisory Council, as well as being able to apply to the organization for advice on any matters of simplification or standardization in this country and in the other large producing countries.

It is hoped, in view of the importance of the work the Association are carrying out for the industries of the country, that the Government will eventually agree to support this national movement to a greater extent than is the case at present. The Prime Minister, who is personally familiar with the work, has addressed a letter to the Chairman expressing the hope that the Association will be successful in the effort now being made to obtain much wider support for their activities, which he feels sure will contribute materially to maintaining and improving the efficiency of our national industries. It is therefore confidently expected that all those who are connected with our great industries will lose no time in giving the Main Committee of the Association the additional support so absolutely necessary to enable them to prosecute this national campaign of industrial simplification and standardization.

DRY GASHOLDERS.

Furthe Note by M. Baril.

The Technical Director of the Société d'Eclairage, Chauffage et Force Motrice, M. Baril (who read M. d'Estape's paper at the recent meeting of the Institution, and replied to points raised in the discussion), sends us the following note. It is, he says, a development of his answer to Mr. J. P. Leather [see "JOURNAL" for June 17, p. 913], and emphasizes the advantage of the tankless design when high wind pressures have to be considered.

[TRANSLATION.]

In countries where high wind pressures are an important factor, it is necessary, in order to ensure the stability of any type of gasholder, to design for comparatively large diameter and small height.

Now the weight of the metal tank of an ordinary holder constitutes a large part of the total; its weight being given by the formula:

$$P = eh \times \pi D \times \Delta,$$

where e = mean thickness of plates
h = height of tank
D = diameter of tank
Δ = density of metal.

But the thickness e is obtained from the formula

$$e = \frac{pD}{2R},$$

when p = pressure on the plate
D = diameter of tank
R = resistance of plate.

So that

$$P = \left(\frac{pD}{2R} . h . \pi D . \Delta\right).$$

Thus it is seen that, for the same capacity, the weight of the tank, and consequently the price of a "wet" gasholder, increase very rapidly with the diameter. Such is not the case with a dry holder, the thickness of the shell of which is independent of the diameter; and therefore this design becomes more advantageous the greater the wind pressures which have to be allowed for.

The provision of rather a large number of pumps is simply a measure of security.

ASSOCIATION OF BRITISH CHEMICAL MANUFACTURERS.

The Ninth Annual General Meeting of the Association, held on July 9, was presided over by the Chairman (Mr. D. Milne Watson), who, in moving the adoption of the report, said the chemical industry, like all other British industries, but fortunately not to such a great degree as some others, was going through a very serious time. He attributed this mitigation in respect to the chemical industry to the organization which they had built-up during the past nine years. Fuller support was given to a trade association in times of prosperity; but a strong association was never so much needed as when trade was bad, as was the case at the present time. What an association could do for a member, the same individual firm could not possibly do for themselves; and, conversely, the Association could not do many things which the firm alone could do. It seemed to him certain that, unless any particular firm were absolutely sure of their position, they might become a casualty, so to speak, in the industrial fight, unless they were prepared to act alongside their associates. This was his view when the members did him the honour to elect him as their Chairman, and he held it ten times more strongly after twelve months in that position. One of the most important events of the year had been the celebration of the discovery of benzene. They were extremely glad to have been associated with the scientists officially in the centenary; and he believed it was probably the first occasion on which the industrialists and the scientists had met together on a common platform in this connection.

The report was unanimously adopted.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Annual Ladies' Day.

Members of the Association, accompanied by their ladies, paid a visit to the New Lytham Gas-Works, at Eastham, last Saturday morning.

The Gas Engineer (Mr. J. H. Ranft) and Mrs. Ranft met the party at Lytham Station; the Corporation providing a motor omnibus to convey them to the new works, situate 1½ miles away. The site covers 10 acres, and is to be laid out to produce the whole of the gas for the borough; it being the intention ultimately to close the Lytham and the St. Annes Works. The sidings are connected to the L.M.S. Railway, and include main and subsidiary sidings to the various sections of the plant, totalling 1¼ miles.

The retort house contains six beds of eight retorts, arranged in one bench. The settings are heated by Drakes' patent furnaces; and the producers are fitted with step grates. The retorts, 24 in. by 18 in. by 23 ft. long, are built of silica segmental blocks. The stoking machine is Drakes' combined charger and discharger. A Drakes' transporter delivers the coke from the retorts to the coke-quenching benches, six in number, arranged outside the retort house. The engine and power house has been designed to accommodate electric generators, coal gas exhausters, and gas compressors. The condensers, Livesey washer, scrubber-washer, purifiers, works holder, and a large spiral holder, were supplied by Messrs. R. & J. Dempster, of Manchester.

Compressors have been installed for the purpose of sending gas from the new works to the Lytham and the St. Annes holders, through 12-in. and 9-in. steel mains 5½ miles long. The station meter was supplied by Messrs. J. & J. Braddock, of Oldham, and has a capacity of 60,000 c.ft. per hour.

After viewing the works, the party went to the Fairhaven Hotel for lunch. Here the President (Mr. J. T. Haynes) expressed, on behalf of the members, their appreciation of the kindness of the Chairman and the Gas Committee in giving them an opportunity to visit the new works, and complimented the Gas Engineer upon the well laid-out scheme. Cars then conveyed the members and ladies to Clifton Marine Park, the Roman baths, and Ashton Gardens.

The Mayor (Alderman C. F. Critchley, J.P., C.C.) met the party at the Palace Café, and extended to the visitors a hearty welcome to Lytham-St. Annes. Mr. Ranft apologized for the absence of his Chairman (Alderman H. N. Whittle), who was unable to be present.

The Hon. Secretary (Mr. J. Alsop), on behalf of the ladies, thanked Mrs. Ranft for her care of the ladies of the party, and said the day had been a delightful one, to the pleasure of which she had contributed largely. Mrs. Ranft briefly replied.

Italian Gas and Water Association.—In the report of the Padua meeting of the Italian Gas and Water Association in the "JOURNAL" for July 15, p. 168, a printer's error occurs in the third line of the paragraph headed "Gas-Works at Padua." The sentence should read "Coal from Durham is shipped," &c., not "Durban."

PRESENT STATE OF THE GAS INDUSTRY IN FRANCE.

To M. A. Grebel, an old friend, we are indebted for a copy of an interesting communication made by him to "Gaz et Cokes," and reproduced in the July 1 number of "La Technique Moderne." This we produce practically *in extenso*, as the events of the last few years have so much increased the mutual interests of gas engineers on both sides of the Channel.

After the war, two important matters prevented for a time the French gas industry from pursuing a programme of rational development. On the one hand there was the necessity for temporary re-arrangement, and the establishment, in co-operation with the municipalities, of selling prices to correspond with the new economic conditions; and on the other hand there was the question of calorific power and debenzolization. These matters have now been settled. There only remain very few municipalities—1 p.ct., perhaps—who have not yet come to some definite arrangement with their gas concessionaries for the modification of the old contracts or their replacement by the modern type of Order, so as to make the selling price of gas fluctuate according to the current economic conditions. The question of debenzolizing gas is at last governed by statute; and in January of this year, the Ministry of Commerce set up a Committee to consider the application of clause 2 of the law of July, 1923, to individual concerns. [The progress of this measure was followed in the "JOURNAL."]

Thus has been removed the uncertainty which reacted upon the free development of gas making. One recognizes that the nature and essential qualities of town gas have hitherto been fixed by the Model Clauses appended to the Government circular of April, 1921, of the above-mentioned law of July, 1923; but undertakings could not hitherto carry out additions to, and modifications of, their plant unless they possessed the certainty of being able to utilize it normally and amortize it over the remainder of their concessions.

In the Régions Libérées, the distribution systems which were for the most part rendered useless—particularly at Rheims, Saint-Quentin, Amiens, Arras, Douai, Tergnier, Chauny, Noyon, &c.—have been almost completely replaced; while some undertakings—for example, the last three mentioned—have not been rebuilt, but will be replaced by a central station (in that instance supplying from Saint-Quentin). The majority of the undertakings not actually in the most devastated area have by now recovered their pre-war output, and are experiencing a normal annual increase. In this regard, figs. 1 and 2, re-

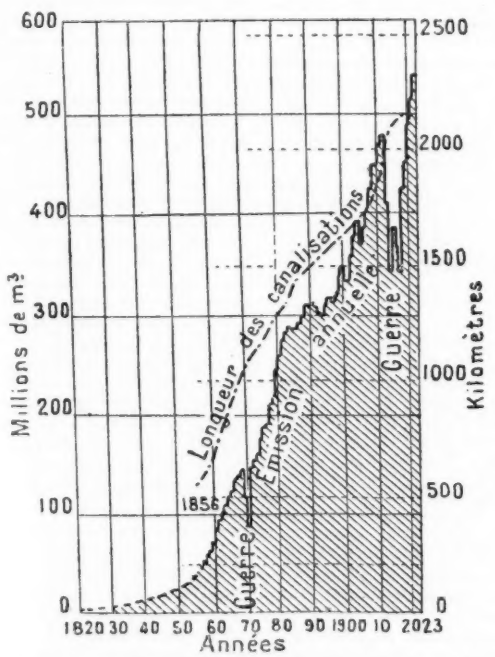

Fig. 1.—Shows the Growth of Output (shaded) and of Mains (broken line) of the Société du Gaz de Paris. It is interesting to note the drop in output registered in the 1870 war as well as the recent war.

lating to the Société du Gaz de Paris and to the Société d'Eclairage, Chauffage et Force Motrice, are most illuminating. Also a noteworthy fact is that the consumption of gas per head has in general increased from 10 to 20 p.ct. over the year 1913-14. These statistics are confirmatory of the vitality of the gas industry, of which the 1924 Congress was such an excellent manifestation.

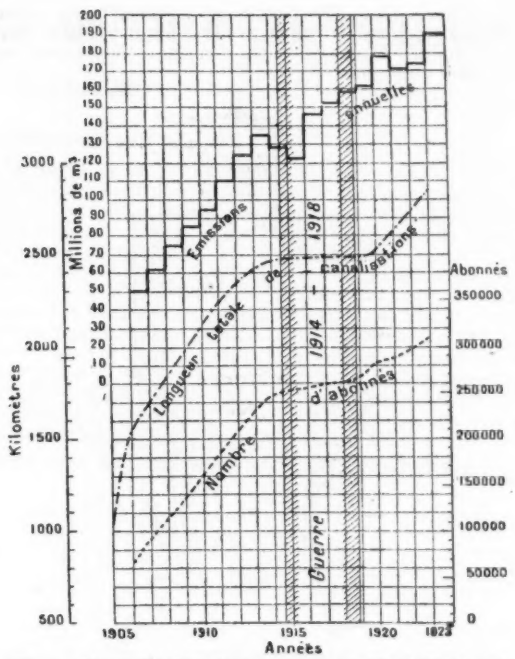

Fig. 2.—Shows the Growth of Output, Length of Mains, and Number of Consumers of the "E.C.F.M.," supplying Greater Paris.

We will now examine the main trend of development and transformation in gas plant and appliances.

GAS MAKING PLANT.

The most prominent factor in selecting a type of coal-gas setting and its auxiliaries is the labour. In very small works, one no longer hesitates to adopt hand-worked charging and discharging machines. In small and medium-sized works, it is often decided to instal a setting of small intermittent vertical retorts to take the place of a setting of eight 3 m. stop-ended horizontals—which after all is a perfectly sound and economical gas maker. As for large works, nowadays one readily sacrifices, for the sake of the almost completely automatic working of continuous vertical retorts, the undoubted advantages—from the point of view of first costs and consumption of coke for firing—of the time-honoured setting of nine through retorts 6 m. long, with coke handling plant and mechanical charging and discharging.

Thus it came about that the Société du Gaz de Paris, in the modernization of their Clichy Works, of which the capacity is 500,000 cub.m. per 24 hours, installed Woodall-Duckham continuous verticals, which are designed to realize good results from steaming, and give a light coke suitable for domestic use. [Here the author gives a few notes relating to the Woodall-Duckham setting, and drawings of the alternative heating arrangements tried by them—see "JOURNAL," Vol. 167, p. 821.] The Paris Company have found that 10 to 12 p.ct. steaming gives the best results in working to the Municipal specification—viz., a gross calorific power of 4500 calories, and a maximum CO content of 15 p.ct. The following table gives the average of several carbonizing tests with and without steaming.

—	No Steam (3 Tests).	10–12 P.Ct. of Steam (16 Tests).
Coal carbonized per retort per 24 hours. Kg.	6547	6471
Gas made per retort per 24 hours. Cubic metres	2285	2875
Yield of gas, N.T.P., per 100 kg. Cubic metres.	34·06	43·15
Gross calorific value. Calories	5343	4667
CO content. P.ct.	9·85	12·70
Heat units per ton of dry coal. Calories	1,936,170	2,137,234
Coke for sale per 100 kg. Kg.	70·4*	68·5
Volatile matter left in coke. P.ct.	2·68	3·03

* From horizontal practice.

With their minds still set upon the reduction of specialized and difficult labour, the Société du Gaz de Paris studied various self-clinkering producers. Attention was first directed to the Marischka self-steaming producer, in which clinkering is automatically carried out by a revolving grate. More attention was paid to ash-fusion producers of the Heurtey-Sauvageon-Sépulchre (fig. 3) and the Marconnet types, which offer a most attractive solution to the problem of ash removal. This is extracted in the molten state, thus allowing of far more intensive running—10 or 20 times the output per unit of grate area, compared with ordinary types in which the ash is extracted as sticky or hard clinker. In general appearance the Heurtey producer resembles a small blast furnace. Steam is admitted by V above the air-blown zone A; and the slag is run out from

time to time at L. The Marconnet producer has a rectangular horizontal section, of which the smallest part is designed for the optimum CO_2 to CO reduction; and the scheme includes automatic coke rams.

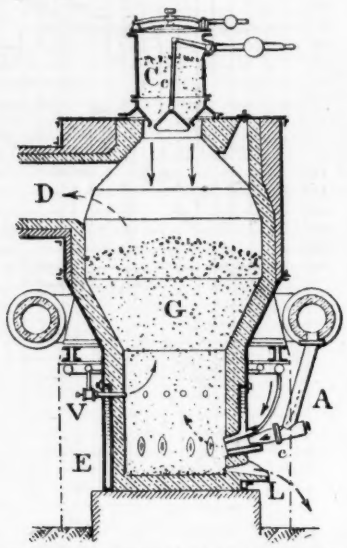

Fig. 3.—Heurtey-Sauvageon-Sépulchre Ash-Fusion Producer.

A.—Blower Outlet. C.—Feeding Hopper.
D.—Gas Offtake. E.—Double Shell.
G.—Fuel Bed. V.—Steam Nozzle.

Whereas, in the design of coke ovens with separate producers, arrangements are made to reheat the producer gas in regenerators similar to those used for the combustion air in gas-works settings, no such provision is made in the case of independent producers on a gas-works. As a result, the advantage of automatic clinkering is in part offset by an increase in heat losses; no use being made of the sensible heat of the gas leaving the producer.

In the largest works in France, horizontal chamber ovens have not met with all the success they merit, because the more important undertakings have allowed themselves to be attracted by the inclined Munich oven, from points in the design of which we have anticipated trouble from the beginning, and of which it appears unlikely that further examples will be built beyond those laid down before the war for the Cornillon Station of the Société du Gaz de Paris. The essential difference between the horizontal chamber oven and the coke-oven heated by poor quality gas, is that in the former the gas coals which are carbonized do not permit the attainment of big heights or more than 6 m. as the length of a chamber, for a longer block of gas coke cannot resist, without jamming, the thrust of the discharger; whereas with coking coals one can extend the chamber to 4 m. high and 12 m. long.

Only two French gas-works have gone in for coke-ovens: Toulouse, during the war; and Strasbourg, where the installation will be finished this year. The Société d'Eclairage, Chauffage et Force Motrice (E.C.F.M.), which is responsible for the gas supply of most of Greater Paris, has just taken up half of the capital of a new Company called Les Cokeries de la Seine. The latter intend to build forty coke-ovens, and the gas produced will be sold by the "E.C.F.M." The coke produced will find a ready outlet in the Paris district. Such a procedure, however, is unlikely to be generally adopted; inasmuch as gas engineers maintain that their job is to withdraw from the coal the maximum heat units in the form of 4000 to 4500 calorie gas.

As for selling coke-oven gas for distribution in the country, this does not develop, even in the North, with the rapidity one would like to see, in view of the excellent examples set by the United States, Westphalia, and Belgium. One can, however, cite the following cases: Société Artésienne de Force et de Lumière, who distribute coke-oven gas from Béthune to Arras and Bully-Grenay, and who are laying mains towards Bapaume, Albert, and Corbie; and the Société Régionale de Distribution de Gaz, who are concentrating on coke-oven gas in the Douai district.

Before leaving carbonizing plant, there is one subject on which we should like to add a few words—the employment of silica segmental refractories for retorts. Fairly lively discussions have taken place between the engineers of houses who make or use silica materials, and those who still advocate silicious materials—perhaps the latter are waiting until they are in a position to carry out the more delicate process. The employment of silica, albeit costly, is almost exclusive in America, is spreading rapidly in Germany, and tends to become general in England, not only for coke-oven settings, but for gas retorts built up of tongued and grooved segments. The argument about the coefficient of conductivity of the silica brick being rather below that of the silicious brick, and the further highly controversial point as to compactness, disappear in face of the fact that the silica brick, not softening much before its compression limit, allows the design of thinner walls, the attainment of higher temperatures, and in consequence the realization in practice of a better heat transmission.

Economy of Heat and Fuel.

The increase in the price of coal and its shortage during the war have directed attention to the utilization of the heat carried away in chimney gases, and of the sensible heat in unquenched coke; the main object being to obtain a supply of steam, as regards which gas-works are often indifferently provided.

Contrary to the widespread opinion, it is possible to produce quite large quantities of steam from the gases leaving even a well-regulated bench; but in no fashion can the object be achieved by a boiler primarily designed for the consumption of solid fuel. It is necessary to provide near the setting a special boiler in which water tubes are nested together in large numbers and present a big surface to the gases. Often it will be necessary to employ forced draft to supplement that of the chimney.

The author then touches on the Sulzer method of producing steam from the sensible heat of coke, as applied in numerous Swiss gas-works. A container for the coke is joined to a steam generator in the form of water tubes through which the inert gases from the coke are circulated by a fan. It is remarkable that, although the red-hot coke carries, in the form of sensible heat, about a quarter of the heat put into gas-works settings, and almost half that put into coke ovens, and although steam requirements must increase considerably now that debenzolization is a necessity, nevertheless engineers in France are hesitating to adopt this process, for, they say, one cannot be sure that such a plant will "pay" in France under current economic conditions.

Also in the direction of fuel economy, great strides have been made in the recovery of coke from clinker, pan ash, &c.

(To be concluded.)

Removal of Tar by the Cottrell Process.

The Cottrell process for use in removing tar from manufactured gas is in the hands of the U.G.I. Contracting Company, of Philadelphia; and some particulars of it were given by Mr. C. A. Schlegel, in a paper to the Southern (U.S.A.) Gas Association. The process has been in operation for many years for the removal of suspended particles or mist from gases of industrial processes; but its adaptation to town gas plants is recent—that at the Philadelphia Gas-Works being one of the first installations. This is of a daily capacity of 30 million c.ft.; and a second plant is now being erected. There are also large installations at Denver and Washington; while a contract with the Tampa Gas Company has been entered into. The Cottrell precipitator for the removal of tar consists of a steel shell, in which are grouped a number of vertical pipes 6 in. in diameter and 9 ft. long. In the upper part of the shell is a sheet through which the pipes pass, and with which they make a tight joint, so that the gas entering the lower portion of the shell travels up through the pipes, and out of the shell near the top. In the centre of each pipe is suspended an electrode, extended below the bottom of the pipe, and weighted at the bottom. The electrodes are supported by a framework in the upper part of the shell; and this framework is in turn supported upon insulators in compartments on the side of the shell. A high-voltage unidirectional current is led through a gas-tight insulator to the framework supports and the electrodes. As the shell and vertical pipes are grounded, there is produced in the space between the electrodes and the vertical pipes a corona discharge; and the gas, becoming ionized, permits the flow of a slight current. The result is that the suspended particles entering this electrical field assume, by induction, an electrical charge which repels them from the electrode; and they are driven out of the gas stream to the pipe, and flow down it into the bottom of the shell. The system is guaranteed to remove 90 p.ct. of the tar, and at Philadelphia has taken out from 95 to 97 p.ct. Maintenance and operating costs are low.

A Portable Acetylene Generator.—A small generator for producing acetylene at low pressure for welding and cutting has, says "Industrial and Engineering Chemistry," recently been developed by the Oxweld Acetylene Company, of New York. In the generator an entirely new principle of feed control is used, in which a vertical partition extending nearly to the bottom into a water seal divides the generator shell. One side is gas tight, and contains the carbide hopper at the bottom. The upper part of the other side contains the gas regulating and protective devices, and an automatic carbide feed control. Generation of the first acetylene causes water to rise on this side of the partition high enough almost to submerge a pan of water, hung to a control lever. As acetylene is drawn off, water rises in the gas compartment and correspondingly lowers under the float, relieves some of the buoyancy under the water pan, which, gathering weight with the receding water, depresses the spring and allows a small amount of carbide to drop into the generator, and restores equilibrium conditions.

ANNUAL MEETING OF THE SOCIETY OF CHEMICAL INDUSTRY.

A "SMOKELESS FUEL" SYMPOSIUM.

Abstracts of Papers and Discussions.

As mentioned in last week's "JOURNAL," when reporting a portion of the proceedings at the annual meeting of the Society, the morning of Thursday, July 16, was devoted to a symposium on "Smokeless Fuel" at the University of Leeds, organized by the Chemical Engineering Group of the Society.

Sir ARTHUR DUCKHAM, who presided, said it appeared probable, from the interest of the subject, that there would not be time adequately to discuss all the contributions. The papers in the Coke Competition, organized by the "GAS JOURNAL," were not ready, and perhaps this was all to the good, because it would give an opportunity for them to be studied more thoroughly, and discussed perhaps later. Incidentally he drew attention to a demonstration of coke fires in an adjoining room, and expressed thanks to Dr. E. W. Smith, the Leeds Corporation gas undertaking, and Mr. C. S. Shapley for the trouble they had gone to in arranging this demonstration.

He then called upon the authors of the first two papers.

SMOKELESS FUEL—THE PRESENT POSITION AND FUTURE POSSIBILITIES.

By Dr. C. H. LANDER, Director of Fuel Research, and Dr. MARGARET FISHENDEN.

In this paper the authors draw attention to the fact that there exists an urgent need for eliminating the loss of by-products at present involved in the domestic use of raw coal, and for replacing the latter by some form of smokeless fuel. The solution of the problem, they emphasize, may well prove to lie, not in any single and exclusive method of carbonization, but in several, each operating in the circumstances which are most favourable to its particular requirements. At the present time the only proved economic process for the production of solid smokeless fuel, other than metallurgical coke, is that of the gas-works, which utilize high temperatures of carbonization.

In up-to-date gas-works practice, when steaming is resorted to, the yield of gas from the carbonization of a ton of good-quality coal averages some 15,000 c.ft. of a calorific value of about 500 B.Th.U. per c.ft., or 75 therms, generally the equivalent of some 25 p.ct of the potential heat value of the coal used in its production. The saleable gas coke represents a further 50 p.ct., and tar about 6 p.ct. The loss then amounts to no more than about 19 p.ct., while for most purposes the availability of the heat units in the products is a great deal higher than those of the original coal.

The resulting products from the low-temperature carbonization process differ fundamentally according to whether the retorts are externally or internally heated. In the former case, some 300 or more c.ft. of gas of calorific value 1100 to 700 B.Th.U. per c.ft., and generally the equivalent of some 30 to 35 therms, or 10 to 12 p.ct. of the heat value of the coal treated, are produced, together with about 14 cwt. of coke, representing a further 70 p.ct. of the calorific value of the coal, and 15 gallons of oil, equivalent to about 25 therms, or 8 p.ct. of the heat of the coal. The loss thus appears to be only about 11 p.ct. less than in the high-temperature process, but no allowance has been made for the fuel required to heat the retorts, and with this correction the thermal advantage is not upheld.

Speaking of coal conservation, the authors say that it is a fallacy to regard this as an exclusive consideration. To the owner of an industrial concern it is a matter of little significance except in relation to the bearing which it may have upon the price of fuel. To carry out the necessary processes at the lowest possible cost consistent with satisfactory results will always be his primary aim. And in the realization of this ideal the initial price of his heat units per therm is only one governing factor. Thus, for example, although the price of the therm in gas is usually much higher than that in coke or coal, if its use should entail a reduction in labour costs, or make possible a more accurate focussing of the heat produced upon the place where it is required, or, alternatively, if it should be instrumental in creating a better product, it would be commercially sound to use it in preference to a cheaper fuel.

The gas yielded from the carbonization of such an amount of coal as would produce coke sufficient for all steam-raising purposes would be far in excess of any demand at present likely to be created. It would involve the carbonization of nearly 200 million tons of coal per year, which is considerably more than our present total consumption, and ten times the amount which the gas-works yet deal with. If a low-temperature system were employed in place of the gas-works process, the corresponding quantity of coal absorbed would be somewhat reduced, as the coke yield would be higher. But there would still be produced gas enormously in excess of the ordinary requirements of the country. It must, however, be observed that a steady market for coke would result in a reduction in the price of gas, and a consequent increase in its use. It is conceivable that it might be employed for heating the retorts. It would, however, not be feasible immediately to substitute coke for raw coal in any very considerable proportion of our steam-raising plant, even were it possible to adapt installations with sufficient rapidity.

The change-over, the authors suggest, will not be abrupt, but will take place slowly, as the applicability of coke to certain special cases becomes recognized. That coke will in many cases gradually replace coal, however, is confidently to be anticipated. Increase in the use of coke will inevitably be associated with increase in the use of gas; and it is by a combination of coke, gas, and electric power, each utilized in the cases to which it is more particularly applicable, that the abolition of industrial smoke will probably be effected.

SOLID SMOKELESS FUELS, THEIR PROPERTIES AND USES.

By EDGAR C. EVANS, of the National Federation of Iron and Steel Manufacturers.

The author describes the various solid smokeless fuels available, including gas cokes made at high temperatures, low-temperature cokes, and coke breeze.

A large proportion of the coke produced in gas-works is used for the production of producer gas for the retorts. Recently successful efforts have been made to utilize coke breeze for this purpose. The rate of gasification is, however, lower than that with larger sized coke; but the Simplex Coke Oven Company gasify coke breeze of 5 to 35 mm. at the rate of 10 to 17 tons per day in a producer of 3 m. internal diameter. The rate of gasification depends on the relative proportions of sizes between 5 and 35 mm. diameter, the rate increasing with the size. It is essential that not more than 10 p.ct. of dust below 5 mm. size should be present. This producer has a double shell, through which hot water at a temperature of 75° to 80° C. is circulated, and is followed by a waste-heat boiler which serves the double purpose of steam raising and dust extracting. Hot water must be used in the outer jacket, for, if cold water is employed, condensation of the steam containing acid vapours from the sulphur in the coke takes place on the inner shell, resulting in marked corrosive action. By maintaining a circulating water temperature, however, of approximately 80°, this is obviated. A similar producer devised by Dr. H. Koppers has been in operation at the Mannheim Gas-Works for some time; and a 7-ft. diameter producer gasifies 15 tons a day of coke of approximately 15 p.ct. of ash all below 1 in. size, and not more than 10 p.ct. of dust through a 3-16th in. mesh. If the coke is below ¾ in. in size, the producer capacity is approximately 12 tons. These figures are based on the use of coke with an ash of normal fusibility.

Recent methods of treatment offer means of considerably improving the quality of gas coke. Moisture in coke can be eliminated by dry cooling; and the author says there seems to be no reason why gas companies should not adopt coal cleaning, and thus reduce the ash content. Gas companies are now largely taking up the practice of breaking and grading their coke, with much improved results from the point of view of use. Difficulty of ignition, slow combustion, and the emanation of sulphurous fumes, belong to a different category, and are probably interlocked one with another. The actual proportion of sulphur in the gas coke is not greater than is the case with coal; but the popular objection to gas coke, due to this reason, is well founded, and is probably owing to the ease with which a back-draught is created, and the frequency with which the products of combustion are blown-back into the room. Further, gas coke burnt in a customary grate goes out unless a fairly large body of fuel is maintained. These disadvantages can be remedied, in so far as existing grates are concerned, by increasing the reactivity of the coke produced.

The term "reactivity," while it means generally the power of the fuel of reacting with oxygen or air, is difficult to define, as it implies a knowledge of so many factors—such as the character of the reacting gas, the temperature of the reaction, the size of the particles of the reacting solid, and so on. Three general methods have been tried of estimating the reactivity of different cokes; and these the author describes, as well as attempts made (through a joint investigation by the Fuel Research Board and the National Federation of Iron and Steel Manufacturers) to devise a means which could be readily applied to works laboratories. He discusses factors influencing coke reactivity, and methods of increasing the reactivity of high-temperature coke.

Concluding his review of low-temperature coke, Mr. Evans says that some of the basic principles of coal carbonization discovered in the prolonged investigation that has been made on low-temperature carbonization are capable of useful application in high-temperature practice; while there seems also to

be a definite scope for the adoption of internal heating for carbonization above (say) 700° C. There are indications that the ultimate solution of the problem of smokeless fuel production will be a compromise between high and low temperature carbonization—a process in which as few gas therms as possible will be sacrificed to obtain a readily marketable fuel. The two systems are already approaching one another. Low-temperature plants now in operation are using a temperature of about 700°, leaving a fuel with 3 to 6 p.ct. of volatile matter; while in high-temperature practice, on the other hand, particularly in the coking industries, the development of coke ovens of the narrow type is tending more and more in the direction of increased reactivity in the fuel.

If the principles requisite for the technical success of low-temperature carbonization can be applied successfully in high-temperature practice, at not too great a cost, the smokeless fuel problem of this country will be in sight of solution.

In some additional remarks in the course of introducing his paper, Mr. Evans said that gas coke was not an ideal domestic fuel, though the gas managers might say so. It had a high ash content, and was difficult to ignite. Speaking generally, low-temperature carbonization, with fuel at ordinary prices, could not compete with high-temperature processes. At the same time, there were conditions under which low-temperature carbonization might be desirable. There might be circumstances in which gas companies, apart from high-temperature work, might be able to use low-temperature carbonization to supply a market existing for a free-burning fuel. The work that had been done on low-temperature carbonization had thrown tremendous light on high-temperature practice, and the two systems were already approaching one another. There were low-temperature plants now in operation working at 750°, and leaving 3 to 5 p.ct. of volatiles in the coke; while the most recent developments in high-temperature carbonization tended to greater reactivity and combustibility of the resulting fuel. The work that had been done had not been wasted. The problem of smokeless fuel production, which was a vital one for the country, would ultimately be solved possibly by high-temperature carbonization, possibly by medium-temperature carbonization, and possibly by low-temperature carbonization; but it was all locked-up with the proper selection of coals and suitable treatment before they were used.

Discussion.

Mr. H. J. HODSMAN, speaking as a consumer of fuel, remarked that for some time he had experimented with different fuels in an ordinary grate. The question of ignition had not worried him, because he always lighted his fires with an auxiliary gas burner. As the result of this work, he had come to the conclusion that the obtaining of satisfactory results was all a question of the form of the grate—not so much the actual size, but the shape and depth. The so-called shallow modern fire grate was undoubtedly limiting the range of fuels. Therefore, fire bars should be put back again. The most serious difficulty about ordinary cokes available was the ash. This was a trouble which any carbonization industry would have to face, if it aimed at giving a supply of 10,000,000 to 12,000,000 tons of carbonized fuel a year. Apart from this, his opinion was that the cokes already available ought to be more extensively used, while people were searching for the ideal fuels which had been described.

Mr. V. R. CHADWICK (Turbine Furnace Company, Ltd.) said that he was specially interested in coke breeze. Mr. Evans need not expect gas undertakings or others to put extra work into the production of coke breeze, because it was essentially a waste product, and, as a waste product, could be sold at a low price. He had yet to find a gas undertaking of any size which was looking for a market for coke breeze; it was all being sold. As far as steam-raising efficiency was concerned, it was quite good. Mr. Evans had made a point about mixing fuels on the "Sandwich" system, and getting the exact proportions of coke and coal. From a number of fairly extensive experiments, he had found that coke breeze mixed with a small quantity of bituminous coal, in the proportion of 12 to 15 p.ct., gave an ideal fuel. With a fuel like this, containing up to 25 p.ct. ash, a Lancashire boiler could be expected to give as much steam under ordinary conditions as with a fairly good coal. It was a queer thing—and he would like his word to be taken for this—that with dry coke one could not expect to get as high an efficiency as if one took a barrow-load of coke and threw a bucket of water on it. He would probably be told that it was impossible to get a higher efficiency when having to drive-off this moisture and turn it into steam than if dry coke were used, but the fact remained that he could get more pounds of steam per pound of fuel with that sort of fuel. In the paper by Dr. Lander and Dr. Fishenden it was stated that the average efficiency of the existing boiler installations in the country probably did not reach 70 p.ct. It did not, by a very long way. Very often it was in the neighbourhood of 56 p.ct., with 2 p.ct. either way. Some special tests had given figures of 70 or 75 p.ct.; but 80 p.ct. had hardly ever been reached. Figures in Mr. Evans's paper showed a thermal efficiency of 61·3 p.ct., with reasonable supervision and using coke breeze. These particular tests, he happened to know, were taken without any expert supervision. Mr. Evans had said that 750,000 tons of coke breeze could be freed every year, if proper methods of screening were adopted; and every ton of this was equivalent to 17 cwt. of best slack. He believed this was the fair proportion; and there was probably not a place where it could not efficiently be used, either alone—with a little sacrifice of the steam output—or mixed. The South Metropolitan Gas Company had a fleet of ten steamers in which they had been burning coal. They were anxious to burn coke, and an attempt was made to do so under the ordinary conditions; but it was found that, whereas with coal the time taken for the journeys to the North of England for the cargoes of coal was 35 hours, with the coke it was 37 to 38 hours. Forced draught was then introduced; and now, notwithstanding that the journey had been reduced to from 3- to 33 hours, considerably less coke was being consumed compared with the coal previously used.

Dr. R. LESSING said Mr. Evans, in his last sentence, had struck the key-note of what had to be aimed at—viz., the proper selection of coals and suitable preparation before they were carbonized. His own work had convinced him that this would have to be done. Until it was realized that coals were different, and that they were prepared indifferently to-day, they could not hope to come to a proper conclusion as to the best methods of making use of coals. As some of them would appreciate, he was referring specially to the ash content of the coal; and he believed this was one of the turning-points in the future carbonization policy. Not only was the ash a great disadvantage to the coke obtained to-day, and likely to be obtained in the future, but it had a profound influence on the other properties of the coke, and particularly the property referred to by Mr. Evans—viz., the internal structure of the coke. As Mr. Evans had pointed out, combustibility, reactivity, or ignition-point, or whatever might eventually be found to be desirable or undesirable properties in coke, were of greater importance than leaving-in a certain amount of volatile matter; and in the paper which he had himself presented on the previous day he had indicated the effect of the mineral constituents in the coal on the chemical changes which took place at high temperature. As to breeze, the point was that it was not so important to find a market for it as to avoid making it. Whatever could be done with coke breeze in the way of firing boilers could also be done with the raw material which went to form the coke breeze, without putting it through the coke oven or gas retort, and expending enormous amounts of heat in doing so. He believed that with the proper preparation of coal beforehand, the constituents which were likely to go to form the smaller friable portions of the coke could be eliminated, and could be made use of under conditions which were suited to them.

Mr. HARALD NIELSEN said the expression "low-temperature carbonization" was used quite a lot; but he was one of those to whom it meant expert financial treatment of coal, and not technical treatment. He wished, from the point of view of the earnest investigators, that many of the statements that were being published broadcast in the Press would cease. A short while ago he read in a daily paper that somebody with low-temperature carbonization claimed to obtain 40 lbs. of ammonium sulphate, 0·7 ton of smokeless fuel, 11,000 c.ft. of 500 B.Th.U. gas, and 25 gallons of oil. That was good. [Laughter.] Again, other people stated that they had put-up plants in their back gardens and distilled 2000 tons of coal. That was also good. [Renewed laughter.] Mr. Evans had said something about the reactivity of coke. When he was a young man, he tried external heating; and now he was doing internal heating, and found that the coke obtained was somewhat more reactive than that resulting from external heating. For instance, with a Scottish non-coking coal, the coke was put into ordinary gas producers; and to his intense surprise he found that the temperature of the gas was below what it should have been. He therefore analyzed the gas; and the figures were rather interesting: CO_2, only a trace; O_2, nothing; CO, 30·8 p.ct.; hydrogen, 12·6 p.ct.; methane, 2·4 p.ct.; nitrogen, the balance. This gas was a straight producer gas with a heating value of 170 B.Th.U. per c.ft., which was also good. Dr. Fishenden had raised the question of the amount of low-grade gas obtained when employing internal heat; but it all depended on the manner in which that internal heat was applied. The indications were that, in the treatment of coal in the future, it would be necessary to divide the process into two distinct phases. In the first, the moisture would be dried-off by heating the coal up to about 200° C. in an ordinary internally-heated drier, as used everywhere on the Continent; and, in the second, the coal would go into a trough, and be heated by circulating gas. If they continued to circulate gas, and only took away the surplus gas, it was possible to get the heat value up to 600 or 700 B.Th.U., and that would go a long way towards a low fuel consumption. Then Mr. Evans had raised the question of producing smokeless fuel. It all depended on what was done. If they worked by distillation, they might succeed; but if by carbonization—well, he agreed with the Prime Minister's recent statement that this was only in the laboratory stage at present.

Prof. J. W. COBB (Leeds University), in joining in thanking those who had brought forward these papers as impartial and competent authorities, said there had been too much written and too much printed by people who deserved neither the one term nor the other. The title of the symposium was "Solid Smokeless Fuel." If it had been held (say) two years ago, the title would probably have been "Low-Temperature Carbonization." This alteration of title, however, had a real meaning, because it was suggested that what was being demanded was solid smokeless fuel produced by any process whatever; and it was only taking what might be called the simplest and most obvious solution when they assumed that this would be the result of low-temperature carbonization. He did not in the least suggest that processes of low-temperature carbonization would not go some distance to fill the bill in proper circumstances. He endorsed entirely the concluding statement in the paper by Dr. Lander and Dr. Fishenden, that there were many roads which it would be useful to travel; and low-temperature carbonization might prove to be one of them. It had, however, a fundamental difficulty to face in this respect—that the process of carbonization itself gave products, solid, liquid, and gaseous, which could all be used without smoke emission, but the process of carbonization involved a thermal and monetary cost which had to be paid for in the enhanced value of the carbonization products. The most unquestionable enhanced value attached to the gas; and this was the basic strength of the gas industry—viz., that its main product was one in which the monetary and thermal value of the material which it produced was

greatly enhanced over that of raw coal. Therefore, what it meant, to summarize the position with regard to low-temperature carbonization, was that either low-temperature carbonization must be a process in which the working costs and the capital costs together were so far altered from the ordinary carbonization process that the process as a whole became a very much cheaper one, or there must be some kind of bye-product, in quality and quantity, forthcoming that would in itself help to pay for the cost of the process. All he could say, from his own knowledge and review of the subject, was that the soundness of this position had not yet been demonstrated as regarded the low-temperature carbonization processes. Turning to the other aspect, the qualities which were available from the product of low-temperature carbonization, and which had made it suitable as a solid smokeless fuel, were qualities which had been very much further examined scientifically in various laboratories and in works processes during the last few years. There had been a great concentration of work on this subject; and that concentration still continued. Understanding of the process of carbonization was really still in its very early stages; and there were quite fundamental principles connected with it which they were only just beginning to investigate and understand. A material might be produced by carbonization at higher temperatures which, on account of the peculiar physical and chemical properties, reproduced the desirable properties of the coke produced by low-temperature carbonization. Dr. Smith had shown him a fire which was burning with excellent effect on coke which had not been produced by low-temperature carbonization at all. The other general feature he wished to bring forward was that, owing to the work with which Dr. Fishenden had been closely associated, but in which others had taken part, it had become very clear that there were two parts to the study of this problem of solid smokeless fuel. One of them was the fuel itself, and the other was the grate used for the combustion of such fuels. Mr. Hodsman had referred to that; and he knew from demonstrations which Mr. Hodsman had made, but which he had been too modest to speak of, that it had been clearly shown that a proper construction of grate for the burning of coke ought to be worked out, and, as a matter of fact, was being worked out, which would render a solution of this solid smokeless fuel problem very much simpler, more complete, and generally applicable.

The CHAIRMAN said it was obvious that this matter was of such interest that the papers could not adequately be discussed that morning; and he was wondering whether some arrangement could be made to have a further discussion on more extensive lines. There was still another paper on the programme; and there were the papers in the Coke Competition which should be presented somewhere. Therefore he hoped it would be possible for the Society to arrange for a fuller discussion at some later date—perhaps in Sheffield or Leeds. As Mr. Woolcock, the President of the Society, was present, perhaps he would see if something on these lines could be done.

Mr. WOOLCOCK intimated that he would give the matter consideration.

The CHAIRMAN said that, before calling on the two authors to reply, he would ask Dr. Smith to say a word about the demonstration of coke fires that had been arranged.

Dr. E. W. SMITH thought some explanation was necessary of the form which the demonstration had taken. Had it been practicable to have a dozen or fifteen fires in a suitable room, it would have been possible to demonstrate each one of the really successful fuels—such as the Nielsen fuel, and the others. In the absence of such facilities, the main idea in the minds of those who had arranged the demonstration was that two main classes of fuel should be shown in operation—viz., graded gas coke and fuel of the type which could best be illustrated by indicating the Nielsen fuel or low-temperature fuel, or high-temperature fuel made to give the same characteristics as the low-temperature fuel. Therefore in the adjoining room would be found two fires—one a very little one, suitable for a small house burning coke, and another which was suitable for a larger house, and burning fuel which could be classed as patent fuel, made in order to give the characteristics of low-temperature coke, and representing both low-temperature and high-temperature material made to have these special characteristics. Another idea behind the demonstration was that it should indicate, not only the possibilities of burning different classes of fuel, but also the different applications to which coke could be put domestically. Thus there would be seen a hot-water boiler to which had been attached a radiator and a hot-water system. There was one point which should be impressed on the minds of everyone present—and that was the request by Mr. Evans for an ideal smokeless fuel. Mr. Evans had said that gas coke was not an ideal smokeless fuel; but he personally wondered whether one used anything which was ideal. A thing which they might think was ideal might not prove to be ideal when they came to use it. There was no doubt—and it had been demonstrated in many places in this country—that properly screened and reasonably dry coke, with less than 5 p.ct. of moisture, and containing not more than 7 or 8 p.ct. of ash, was entirely satisfactory for ordinary domestic heating. In saying this, he was not appealing to the people of the North of England, who must have their kitchen range, fairly high and open in every way, with a very small fuel bed, and must have a big flame going round the oven. Coke was not so suitable under those conditions; but, as Prof. Cobb had pointed out, there were the two sides to consider—a suitable fuel and a suitable grate. In time these grates would be modified; and there was no doubt that coke, properly graded and properly screened, and with a reasonable amount of ash, was entirely satisfactory for domestic purposes, until it was possible to get something better, which was what everybody was after. In the meantime, coke would help to reduce the smoke nuisance.

Dr. FISHENDEN, replying to the discussion, said that her part appeared to lie mainly in the suitability of the fuel for domestic purposes, and also of the various appliances. Mr. Hodsman had made some remarks about the design of grates. Personally she thought the modern grate was entirely wrong in design—at any rate, in some respects. A low narrow grate was fundamentally wrong; but where the modern grate really did score was that it had better draught control than the old-fashioned grate. The best design of grate was one with a big vertical front, and very narrow from back to front for the fuel bed. As to the question of moisture in coke, undoubtedly in open grates, as the moisture content rose, the efficiency fell off considerably, and the coke appeared to burn less brightly. One of the great drawbacks to the use of coke in domestic grates was the high moisture content, as well as the high ash content, because with domestic fuel it was necessary that it should burn-up quickly. This was possibly one of the difficulties with a dense, non-porous fuel, against a fuel with a reasonable amount of volatile in it. Her experience with these fuels was that, if they were put on the thinnest glowing bed, they would burn-up quickly; but that they were not easy to light with wood. Ordinary gas coke was a good substitute for the ideal fuel of the future; but the point where it chiefly broke-down, in her experience, was in the case of top-heated ovens. She did not agree with what Dr. Smith had said on that point regarding the open range used in the North Country. She had tried some low-temperature coke in one of these ranges, with an open fire and an oven at the side, with the fuel falling under the oven, and found, to her surprise, that, not only did the oven heat satisfactorily with a slightly higher weight consumption, as compared with coal (though with an equal therm consumption), but the water heating was more satisfactory than with coal. Other people had obtained similar results. It was with the closed range that coke appeared to break-down, possibly because of bad design. There was a great leakage of cold air.

Mr. EVANS said he really had nothing to answer. Mr. Hodsman had put his finger on a critical point when he had said that smokeless fuel had to compete with domestic coal containing 4 p.ct. of ash. The gas industry had not realized this yet. Dr. Smith had spoken of gas coke suitably dried and graded containing 8 p.ct. of ash; but he would like to know where to get it. It had to be realized that coal cleaning would have to be carried on to a very much greater extent than was now the case, if they were to have a suitable smokeless fuel; and there was a big movement in this direction. One coke works in this country was producing thousands of tons of coke with a guaranteed ash content of not more than 4 p.ct. This was being done by the froth flotation process, and subsequent carbonization in an ordinary battery of coke ovens. This coke was being sold for special purposes; but it was being made—that was the point. It was true that 4 p.ct. of ash was lower than the general practice; but the industry must see its way clear to bringing the ash content in future down to 8 p.ct., and certainly not more than 10 p.ct. The point mentioned by Mr. Chadwick about wetting coke breeze was remarkable; and he would not attempt to answer it. One thing arising out of Mr. Chadwick's remarks was the necessity for standardizing coke sizes in this country. Various people sold coke and coke breeze, and offered varying efficiencies; but nothing was said as to the size. If they could get down to a basis of standard sizes for various cokes, as the result of this discussion, then it would have been well worth while holding the meeting on that account alone. For the rest, the point was the need for a greater realization on the part of the gas industry that its future lay, not only in gas, but in smokeless fuels of every description. If the gas industry would only realize this position, then he did not think they would be long in arriving at a solution of the problem in this country.

The CHAIRMAN, in proposing a hearty vote of thanks to the authors of the two papers, said he was sure that they would feel their efforts had been well worth while. Calling upon Mr. Sinnatt to read the paper by himself and Mr. J. G. King on "A Study of Tars and Oils Obtained from Coal," he said this dealt with a subject which required almost as much clarification in their minds as the subject of a really satisfactory smokeless fuel. He did not think he was going too far in saying that a real appreciation of this question of tars and oils from the carbonization of coal was the basis of the smokeless fuel industry, because unless they obtained a satisfactory tar result or oil result, or tar-oil result, from the carbonization of coal, no process of carbonization would be satisfactory, or be an economical process as far as finance was concerned.

STUDY OF THE TARS AND OILS OBTAINED FROM COAL.

By F. S. SINNATT and J. G. KING.

In this paper the authors say that the crude tars from low-temperature carbonization, in common with those from high-temperature carbonization, suffer from the disadvantage that they are not miscible with petroleum oils in all proportions. Though this disadvantage may be serious when the amount of low-temperature tar available is small in relation to the petroleum products, it would not be so serious if sufficient tar were produced to allow of depots being supplied from home sources. In this the chief difficulty would be that a vessel leaving England using low-temperature tar as fuel oil, and finding it necessary to take in supplies of petroleum fuel oil, would have to ensure the complete removal of the tar fuel from its oil bunkers before doing so. The authors say, however, that there is reason to believe that without great expense low-temperature tar may be converted into a product miscible with petroleum in all proportions.

Attention is drawn to the fact that low-temperature tar must be studied, not only as a fuel oil, but as a possible source of chemical products. It contains certain of these products, such as phenols, in common with ordinary coal tar. The important compounds benzene, toluene, xylene, naphthalene, and anthracene are not found in low-temperature tar; and in this respect the production of high-temperature tar will continue to be necessary to provide supplies of those compounds which are vital to such chemical industries as the manufacture of

dyes, explosives, photographic materials, &c. In other directions, however, the products from low-temperature tar will encroach upon the markets supplied at present by ordinary coal tar.

It is not easy, state the authors, to compare the yield of tar by low-temperature with that obtainable by high-temperature methods. It is generally assumed that an average of about 10 gallons will be obtained in gas retorts, and that this amount may be increased in vertical continuous systems by steaming; but in the official returns of the principal gas-works for 1924 the amounts vary considerably. The highest yields shown are 16·5, 14·3, 14·1, and 13·1 gallons of tar per ton of coal.

By carbonizing at 600° C., in horizontal steel retorts, a coal consisting of 60 parts of Mitchell Main with 40 parts of Ellestown Main, the yield of tar was 16·3 gallons per ton of dry coal. A further examination was carried out of another tar produced by the carbonization in continuous cast-iron retorts of a similar coal blend. These retorts are in operation at the Fuel Research Station, carbonizing 1·5 tons of coal each per 24 hours at a working temperature of 600° to 620° C. in the combustion chambers.

The yield of tar from the retorts was of the order of 16·5 gallons per ton of dry coal charged. The distillation of the tar was carried out in an experimental still of 1 ton capacity. The yield of refined products shown below is calculated to a gross yield of tar of 16·5 gallons per ton of dry coal.

Distillation of Low Temperature Tar on a 1 Ton Scale

Tar yield, 16·5 gallons per ton of dry coal.

Fraction.	Crude Oil.	Refined Oil.			
	Gals.	Gals.	*d*15.		Lbs.
0°—170° C. . .	1·32	1·2	0·86	Pitch . .	51·5
170°—230° ,, . .	3·53	2·1	0·91	Tar acids—	
230°—270° ,, . .	1·60	0·7	0·97	Crude .	2·42
270°—315° ,, . .	3·27	1·7	1·00	Refined .	2·15
315°—360° ,, . .	2·60	1·5	1·02	Losses . .	2·9
	12·32	7·2			

In addition to the yields given for the tar fraction, a further 1·5 gallons of light spirit may be recovered by scrubbing the gas produced during carbonization. Parallel experiments showed that the amount of such spirit recoverable per ton of dry coal is as follows:

Gas yield	3200 c.ft. per ton of dry coal
Crude spirit from gas . .	1·54 gals.
Refined spirit from gas . .	1·39 ,, at 0·73*d*.

This refined spirit is lighter than a standard motor spirit, and may be mixed with the heavier spirit obtained in the distillation of the tar. The heavy spirit has been shown to amount to 1·2 gallons after refining, and would thus yield a total of (say) 2·6 gallons of motor spirit per ton of coal carbonized. The distillation range of the mixed spirit resembles that of good petroleum spirit. Some difficulty exists in the efficient refining of the mixed spirit, as it exhibits a strong tendency to polymerize on standing. Recent work has shown that this deficiency can be overcome.

The CHAIRMAN said the paper dealt with a subject upon which he himself had always been very inquisitive, and it was only after having heard it that he had been able to form anything like an opinion on this interesting and complex matter. It seemed hardly worth while starting a discussion upon the paper, however, with so little time available; but as he knew the authors and the Director of Fuel Research desired a discussion upon it, every effort should be made to place any further information which others might have at the disposal of them. In return, the Director of Fuel Research was only too willing to give full details of the work being done at the Fuel Research Station. Therefore he asked all those who had done any work on the subject to get into touch with the Fuel Research Board, and to send along any information or suggestion they might have. He understood that any communications sent in would be printed in the Transactions of the Chemical Engineering Group, with the papers, and the authors would be pleased to answer any such written criticisms.

Mr. C. S. GARLAND (Chairman of the Chemical Engineering Group) proposed a hearty vote of thanks to Sir Arthur Duckham for presiding over the meeting.

Subsequently the demonstration of fires using coke, which had been referred to by Dr. E. W. Smith, was given.

Mr. Henry Ellison, manufacturer and chemist, who was on the Boards of a number of gas companies, and who died last April, at the age of 77, left estate of the gross value of £257,758, with net personalty £216,896.

Mr. Robert Dempster, J.P., of Vale Royal, Northwich, Cheshire, and formerly of Elland, a Director of Messrs R. & J. Dempster, Ltd., of the Gas Plant Works, Newton Heath, Manchester, and of various other companies, who died at Capetown on May 17, aged 73, left estate of the gross value of £518,819, with net personalty £516,017.

CONTROL AND AUTOMATIC REGULATION OF CHIMNEY DRAUGHT.

By A. NERRIÈRE.

[From a Paper read at the Meeting of the Société Technique.]

Experiments over a long period at the works of the Société Lebon & Cie have emphasized the importance, for the efficient working of ovens, of absolute regularity in chimney draught. The effects of variations due to atmospheric conditions, wind, temperature, &c., are of far more importance than is generally supposed, and other causes more directly concerned with the plant itself play their part, such as the volume and temperature of the waste gases, and the resistance of the chimney itself and the connections between it and the damper, which may vary considerably according to their state of cleanliness.

The apparatus described was designed with the object of providing a recording instrument which would be simple and strong, and at the same time very accurate—recording differences of less than one-tenth of a millimetre water gauge; the instruments generally in use being considered insufficiently precise. It consists essentially of a balance arm carrying at one end a small bell C, counterpoised at the other end by a weight A and a metallic cylinder P. The apparatus stands in a tank R, the water level of which is so adjusted that the cylinder P is half immersed, and the level is maintained by means of an overflow. A registering drum is rigidly fixed to the base which supports the balance and the tank, and any displacement of the bell is recorded by means of the pen B.

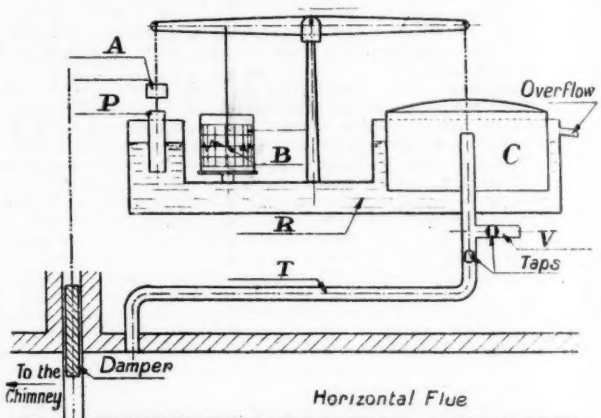

Fig. 1.—Draught Recorder.

A pipe T, which passes up into the interior of the bell, communicates with the part of the horizontal flue where the pressure registration is required. The branch T, which is fitted with a tap, enables the interior of the bell to be put into communication with the air. This having been done, the balance is set in equilibrium by adjusting the weight A. Communication with the air is then shut-off, and, when the suction on the flues is established within the bell C, the latter tends to sink, and its movement is regulated and limited by the displacement of the plunger P, which acts as a check on it. For the purpose in question, it is necessary to register all pressures above and below a definite normal. In this case, equilibrium is established at the normal draught, so that the pen is on the zero line of the recording gauge. When the draught on the flue exceeds the fixed mean, the bell sinks in the water, and the plunger on the other side rises. The pen also rises, and makes an upward stroke on the drum, until the depression of the bell is compensated by the extra weight of the plunger as the latter rises in the water. In the instrument used by the author, adjustments are so made that alterations of one-tenth of a millimetre water gauge are represented by 2 mm. vertically on the drum gauge.

The paper next describes an automatic draught regulator which is similar in general design to those commonly in use, with minor variations introduced with the object of enabling very nice adjustment.

An instrument which is claimed to be of a new type is then dealt with in detail. It enables the force of the chimney draught to be accurately set, and to be maintained at whatever level desired by the automatic variation of the damper opening.

The apparatus, which works on the horizontal flues, and is situated somewhere in the neighbourhood of the chimney, is on the pulley and counterbalance principle. The counterweight is suspended in a trough, in which the depth of water is automatically varied. The weight is such that, when it is half immersed, the instrument is in equilibrium. For opening and closing the damper, therefore, half the displacement in water

of the counterweight is available; but the force required is very little, the axis of the pulley being mounted on ball bearings.

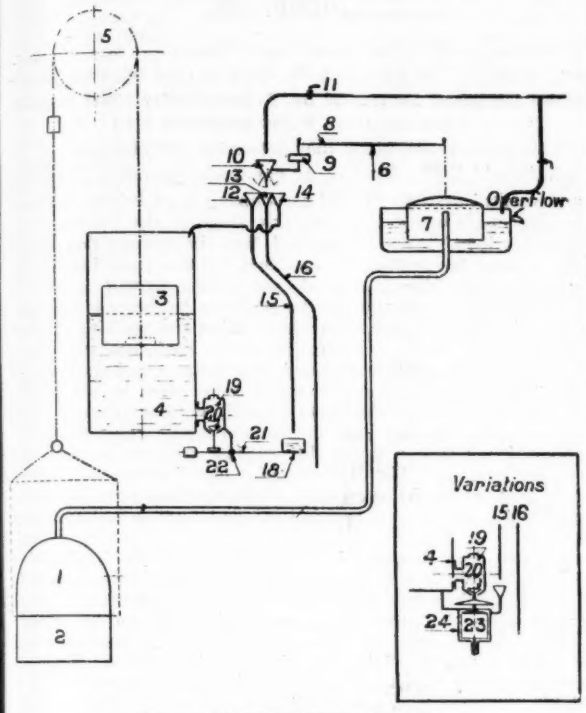

Fig. 2.—Automatic Damper Regulator.

The variation of the water level in the trough, which is the means of ensuring, through varying the opening of the damper, a constant draught on the horizontal flues, is obtained by means of a balance arm 8, carrying at one end a bell 7, the interior of which is in communication with the horizontal flue. The size of the bell is such that a difference of 1 mm. water gauge in the pressure corresponds to a minimum force of 50 grammes. The opposite end of the balance arm controls a pivoted funnel 10, which is suspended above three funnels fixed side by side, and running into three separate pipes. The position of equilibrium, which corresponds with the predetermined and required draught on the chimney, is obtained by suitable weights at the point 9, and is such that the funnel 10 is in a vertical position, and directly above the funnel 13. A stream of water, which is introduced at point 11, then runs away through the latter with no effect. If the pressure in the flue (2) increases, the stream of water is diverted into the fixed funnel 14 through the displacement of the pivoted funnel. This water passes into the tank 4, and there raises the level of the water. The counterweight 3 is thus raised, lowering the damper 1, and thus reducing the pressure to the desired level. In the other event, the stream of water passes into the funnel 12, and so to the container 18. This is supported by the lever arm 21, which, being depressed by the additional weight, opens the valve at the bottom of the tank 4, and so lowers the level of the water, with the corresponding effect on the damper 1. The pressure thus returns to normal, and the water no longer flows into the container 18. The latter is perforated at the bottom, so that it empties as soon as no more water runs into it.

A variation of the working of the tank valve without a lever is shown in the small diagram in fig. 2. In this case, the water coming through the funnel 12 runs into a container 24, and raises a float in it, which actuates the valve.

Considerable experience with these instruments has convinced the author of their usefulness. The results obtained are shown in a diagram as traced on the register for a normal working day of mild wind. They show that the draught was maintained constant to within about one-tenth of a millimetre.

Coke-Pushing and Coal-Levelling Machine.—Describing a machine which has been designed by the Wellman Smith Owen Engineering Corporation, Ltd., of Nos. 36-38, Kingsway, London, W.C., for performing the three operations of door handling, coal levelling, and coke extraction, "Engineering" points out that the introduction of the large-capacity coke oven with its silica construction and quicker coking time has necessitated the development of heavier and much more substantial machinery to carry out the charging, discharging, and quenching operations which are involved. The machine illustrated, which runs on rails laid parallel with the face of the ovens, carries three independent mechanisms for performing the operations specified; and all the movements are power actuated, with the exception of the location of the door-lifting lever.

GAS ENTERPRISE IN HAMILTON.

Inauguration of New Holder.

On the invitation of the Provost, Magistrates, and Town Councillors of Hamilton, a representative company assembled at the Hamilton Corporation Gas-Works on Thursday last for the purpose of inaugurating the new gasholder. The ceremony of turning on the gas to the town was performed by ex-Bailie R. G. Slorach (the Convener of the Gas Committee). In addition to members of the Town Council, there were present Mr. P. M. Kirkpatrick (Town Clerk) and Mr. David Robb, Mr. Robert Gray, and Mr. R. O. Frame (Manager, Assistant Manager, and Cashier at the gas-works), as well as Mr. P. S. Laidlaw, of the Barrowfield Iron-Works, Glasgow; Mr. James Gray, of the Ferro-Concrete Company, Glasgow; Mr. R. L. Chambers, of the Barrowfield Iron-Works; and a number of gas engineers, including Mr. James Campbell, of Dunfermline (the President of the North British Association of Gas Managers).

Provost Sir Henry S. Keith, who presided at the inaugural ceremony, expressed, on behalf of the Town Council, their appreciation of the attendance of so many gas managers from all parts of Scotland. It was an interesting event, the inauguration of a new gasholder—the largest in the history of Hamilton—and he did not know whether there would be room for a third holder on the same site, should it be found necessary.

Ex-Bailie Slorach said he felt highly gratified, as Convener of the Gas Committee, that he should have the honour of setting this magnificent piece of new work in operation.

At the luncheon which followed in the Royal Hotel, Hamilton, Mr. DAVID ROBB (the Manager) supplied some valuable data relative to the erection of the holder. He explained that special precautions had to be taken in regard to the foundations of the holder, as, apart from the usual subsidences due to mineral workings in a mining district like Hamilton, the site was an old quarry, which had been filled up some twenty or thirty years ago with all kinds of rubbish. A scheme of reinforcing by means of piles and a concrete raft was considered; and eventually the Hennebique method of reinforcing was adopted. The contract was carried out by Messrs. Gray, of the Ferro-Concrete Company, Ltd., Glasgow, at a cost of £6540. Although the Committee felt this was rather a costly part of the scheme, taking into consideration the nature of the soil of which the site was composed, and the formation of the old quarry on which the holder had to be built, they considered it would be wise to make sure of good foundations.

Mr. Robb went on to explain that no fewer than 215 reinforced concrete piles 14-in. square were driven to an average depth of 34 ft.; and a reinforced concrete raft, 9 in. in thickness, was laid over the piles, with suitable beaming from the haunches of the pile heads. The part bearing upon the piles and the part bearing direct upon the rock were made rigid throughout, and the same beaming was carried over the rock. The cement for the piles was composed of 7 cwt. of best English cement, 13½ c.ft. of clean sharp sand, and 27 c.ft. of aggregate slag. For the raft, the cement was composed of 6 cwt. of best English cement, 13½ cwt. of clean sharp sand, and 27 c.ft. of aggregate slag. The slag aggregate was not less than ¼ in. and not more than ¾ in. The load per sq.ft. was about 18·8 cwt.; while the raft was designed for a super load of 21 cwt. per sq. ft. The cost of the new holder and tank—£27,000—included the inlet and outlet pipes, together with all necessary valves, syphon pots, and special castings.

Continuing, Mr. Robb explained that the old holder was erected in 1895 by the same firm of contractors as had been engaged on the present occasion—viz., the Barrowfield Iron Works, Ltd. It had a working capacity of fully 700,000 c.ft. Unfortunately the tank was now considerably off the level, due to mineral operations; and it had been found necessary to repair it on three different occasions. Indeed, on the last occasion they had to empty the tank and put the holder out of commission. In the case of the new holder, the whole of the structure, in accordance with the contract, was to receive two coats of fresh oxide paint outside, and one coat inside. Previous to the applications of these coats, however, the Corporation painted the structure both internally and externally. They arranged for a primary coat of white and red lead in the proportion of four of red to one of white lead; the ironwork being thoroughly cleaned before this was applied. No doubt, the application of this mixture of genuine white and red lead was somewhat expensive; but as a primary coat he (Mr. Robb) thought it was well worth the extra cost.

Ex-Bailie SLORACH, replying to "Success to the Hamilton Gas Undertaking," gave some amusing particulars of the earlier years of the gas business in Hamilton. He then passed on to refer to the fact that the work which was being inaugurated that day had been finished without any extras requiring to be paid. It was equally satisfactory to report that no accidents had occurred during the operations. The total expenditure to date on the gas-works of Hamilton was roughly £141,000. Already they had paid off about £70,000 of this sum, besides handing over at least £42,000 for the relief of rates. He thought those present would be ready to acknowledge that this was an exceedingly gratifying position. The

price of gas had fluctuated during the last 25 years between 3s. 8d. and 1s. 8d. per 1000 c.ft. At the present time it was 2s. 6d.—among the lowest rates charged by companies or corporations in Scotland. In 1914 they replaced the horizontals with the Woodall-Duckham type of vertical retorts; and these had proved most satisfactory. The new holder had a capacity of 1¾ million c.ft., and was of the spiral type. All practical men were unanimous in pronouncing it to be an excellent piece of workmanship. The Gas Manager (Mr. David Robb) prepared the whole plans and specifications; and the work was most creditable to the contractors and to himself.

Speeches were also made by Sir Henry Keith (the Provost), Mr. Porteous Laidlaw, Mr. J. W. M'Lusky (Glasgow), Mr. James Campbell (Dunfermline), and Mr. John Wilson (Motherwell).

Mr. James Gray, of Gray's Ferro-Concrete Company, Ltd., whose firm constructed the foundations for the holder, replying to the toast of "The Contractors," dealt at some length with the unusual difficulties of the site. He paid a warm tribute to the consideration and courtesy which he had received at the hands of the Gas Manager and other officials of the Corporation during the progress of the work.

Mr. R. L. Chambers (General Manager), replying on behalf of the Barrowfield Iron-Works, Ltd., who erected the holder, while endorsing all that Mr. Gray had said, made special reference to the new type of steel carriage which has been applied to this holder. The principal feature in this, beyond its substantial simplicity of design, is the locking face, whereby careful adjustment of the rollers at erection can be assured, and all subsequent adjustment to take up wear can be made with the assurance that the complete shear on the bolts will always be taken by the locking face, which consists of standard Whitworth threads milled out at right angles on the pressed steel bed plate. Another interesting feature referred to was the anti-syphoning device. The anti-syphoning action is obtained by slightly constricting the steam pipe at some point above the water level, thereby producing a slight indrawing of air. The effect of this opening is twofold. In the first place, the air so aerates the water that it is driven forward in a condition resembling milk; and, secondly, the reduction in gravity obtained by these means, together with the steam condensed, causes an unusually rapid circulation of the heated liquid, much in the same fashion as a drop of oil spreads rapidly over the surface of water.

After paying special tribute to the good work done by the rank and file on the job—rivetters, caulkers, and so on—Mr. Chambers presented Bailie Slorach with a massive silver rose-bowl, as a memento of the occasion, on behalf of the two contracting firms.

An Attractive "B.C.G.A." Advertisement.

The advertisements of the British Commercial Gas Association have a reputation for attractiveness. They are the product of those who understand the technique of advertising with the one object in view of arresting the attention and interest of the public. The "Daily News" last Friday contained a full-page advertisement from the Association with features which made us examine and read it not only once, but several times. We look upon a light sketch from above of the City of London, with its distinctive features clearly exposed. Beneath the illustration are the words "The City of Sunshine—An Ideal that is being realized." In a home a mother and son are sitting looking at "the pictures in the gas-fire." We read of how smoke is the enemy of health; of how gas-fires promote sunshine and health; and of the convenience and economy of gas-fires. The good advice is given to "decide now to have your homes equipped with gas-fires, and help to make yours a City of Sunshine." If the advertisement has not been seen by any gas men, the omission should be remedied. We believe that copies can be obtained from the "B.C.G.A."

Grinding Coke for Analysis.—In one of the notes communicated by the Acting Director of the United States Bureau of Mines to the "Journal of the Franklin Institute," Mr. W. A. Selvig deals with methods of laboratory grinding of coke for analysis. It appears that experiments were made at the request of the American Society for Testing Materials as to the probable contamination of laboratory samples of coke when pulverized to pass a No. 60 sieve of the United States Standard Sieve Series, by methods other than by ball-mills or hard-steel diamond mortars. After pulverizing, representative samples were analyzed by the Bureau of Mines at Pittsburgh for ash content, to detect any contamination of the samples by the pulverizing apparatus. The results showed that coke samples may be pulverized to pass a No. 60 sieve for laboratory analysis by means of Abbe ball-mills with flint pebbles, roll crushers kept in good condition and with the rolls rotating at the same speed, or by impact in a hard-steel diamond mortar, without any appreciable contamination from the grinding apparatus. Disc pulverizers or bucking boards are likely to contaminate the coke appreciably. Pulverizing in a hard-steel diamond mortar is tedious. Ball-mills or roll crushers appear to be the most practical methods for pulverizing coke to pass a No. 60 sieve.

TREATMENT OF EFFLUENT SPENT LIQUORS FROM THE DISTILLATION OF AMMONIACAL LIQUOR.—II.

In Continuation of the Information Given in Reports 1921, 1922, and 1923—see "Journal," Vol. 159, p. 150, Vol. 163, p. 256, and Vol. 167, p. 324, &c.

[From the Report for 1924 of Dr. T. Lewis Bailey, Chief Inspector under the Alkali Works Regulation Act.]

The general conditions that determine the character of the ammoniacal liquor obtained at gas-works operating horizontal and vertical systems of coal carbonizing were briefly discussed in last year's report. At an early stage in the course of our investigations, it was recognized that the composition of the liquor may be profoundly modified by the conditions under which condensation is effected, and by the manner of storage. The attention of the gas-works engineer in the past has been directed almost exclusively to the erection and working of plant necessary for the due purification of the crude coal gas manufactured. This attitude of mind may have served well enough at a time when horizontal systems alone were in use. With the advent of the vertical retort conditions have changed, and effluent spent liquors from the ammonia still which were once accepted without question by sewage authorities are now causing concern. The difficulty is rendered more acute by the fact that methods of sewage treatment are now being remodelled; and it must be admitted that there is just cause for anxiety.

Liquors from horizontal retort systems of coal carbonizing were relatively free from contamination with higher tar acids and other colour-producing bodies; those from vertical retort systems, on the other hand, are highly charged with such bodies. But apart from this special source of contamination to which ammoniacal liquors of a certain class are liable, it cannot be denied that effluent spent liquors in general are of a highly polluting character, and that one is justified in submitting the conditions that control their genesis to the closest scrutiny, for the purpose of determining whether it may not be possible to obtain a better product without undue cost or trouble to the manufacturer. The present research has been continued in this spirit during the past year. Advance has been slow, owing to the delay in erection of plant, and to the intermittent character of the operations at certain of the works where experiments have been undertaken at the suggestion of the Department; but results, on the whole, have been encouraging, and more rapid advance is anticipated during the coming year.

Laboratory and Works Investigations.

Before setting out the results of the experimental work in detail, it will be convenient to consider the general character of the ammoniacal liquor obtained from the storage wells of horizontal and vertical retort systems. The following table is based on figures contained in the 1923 report, and will serve sufficiently for the purpose in hand.

Liquor from Storage Well as Made.

—	Horizontal Retorts.		Vertical Retorts.	
	Pts. per 100.	In Terms of O/A Pts. per 100,000.	Pts. per 100.	In Terms of O/A Pts. per 100,000.
Phenol as C_6H_5OH	0·162	290	0·327	580
Thiocyanate, as CNS	0·240	195	0·216	180
Thiosulphate, as S	0·072	60 =320	0·045	40 =550
Other forms (including colour-producing bodies) by difference	..	65	..	330
	..	610	..	1130

Of these oxygen-absorbing impurities phenol alone is volatile in steam. Removal of the whole of the phenol, were this possible, would still leave a liquor which, from the point of view of ultimate disposal, could not be regarded as satisfactory. It will be convenient to consider each of the four sources of pollution separately.

Phenol.

Reasons were given in the 1921 report for regarding phenol as the most noxious constituent of the normal effluent spent liquor from ammonia plants. The point finds confirmation in an article by H. F. Stevenson, entitled "Notes on the Toxicity of Trade Waste," published in the "Journal of the Society of Chemical Industry," of Jan. 9, 1925. The author there remarks:

> Again, phenols and thiocyanate are found in refuse water from gas-works, and both substances readily reduce permanganate. But the toxicity of phenols is much higher than that of thiocyanate, and accordingly a gas refuse giving a high permanganate figure might be either toxic or comparatively harmless to fish.

One was justified, therefore, in directing attention primarily

to phenol, and in elaborating methods for its removal in a current of boiler-fire gases. The erection and working of dephenolating scrubbers at the Hornsey Gas-Works was fully dealt with in the three earlier reports. The scrubbers continued at work during 1924, and are said to deal satisfactorily with the whole of the effluent liquor from a 3-ton sulphate of ammonia plant.

A somewhat similar plant is in successful operation at a large gas-works in Lancashire. Two scrubbers are there in use; each 3 ft. 6 in. in diameter, with 12 ft. of "propeller" packing (115 c.ft.). They together deal with 18,000 gallons of spent liquor per 24 hours. Boiler-fire gases are injected into the base of each scrubber by an injector of the Meldrum type (4 in. body, $\frac{7}{16}$ in. nozzle), working at a steam pressure of 70 lbs. The inlet to each scrubber is 4 in. diameter, and the exit pipe to the chimney stack 9 in. diameter. Feed liquor enters at 94° C., and the treated liquor leaves at 95° C. On the occasion of a special test, when samples of the feed and effluent liquors were sent to us for analysis, a phenol volatilization efficiency of 94 p.ct. was attained, with a reduction in the total O/A figure of 34 p.ct. The oxygen-absorbed figures for thiocyanate, thiosulphate, and other compounds (difference figure) showed no reduction.

A steam injector, however, is by no means an ideal motive power for driving the hot gases through the dephenolating tower, as the bulk of the steam condenses in the lower section of the tower, and is not available in the upper section, where it is needed to provide a body of vapour into which the phenol can volatilize. Fuel consumption, therefore, is heavy in relation to work done. The conditions for efficiency were fully discussed in the 1921 report.

Plant on novel lines, involving the use of a dephenolating trough, set in a hot by-pass flue, is to be erected at a gas-works in the Midlands, and should shortly be at work. Results are awaited with interest, as the plant embodies various improvements suggested by experience gained in the laboratory.

Phenol in Devil Liquor.

At an early stage in the course of the investigations, our attention was drawn to the high proportion of phenol in the devil liquor obtained from a sulphate of ammonia plant. The following figures will serve to illustrate the high phenol content of such liquors. Thiocyanate and thiosulphate are seldom present in devil liquors in other than traces.

Phenol in Effluent Spent Liquor from the Ammonia Still, and in Devil Liquor from Condensing Plant.

—	Works A. Horizontal Retorts. Effluent from Still, Exclusive of Devil Liquor.	Works A. Horizontal Retorts. Devil Liquor. "Hot."	Works A. Horizontal Retorts. Devil Liquor. "Cold."	Works B. Vertical Retorts. Devil Liquor.
Volume, gals. per 24 hrs.	10,300	620	520	..
Temperature, °C. . .	..	88	48	63
Analysis, pts. per 100:				
Cyanide, as HCN . .	*Nil*	0·002	0·015	0·025
Sulphide, as H_2S . .	*Nil*	0·002	0 020	0·050
Phenol, as C_6H_5OH . .	0·200	0·552	0·807	0·760
Oxygen absorbed (4 hrs. test), pts. per 100,000 .	780	1,030	1,640	1,540

The ammonia still, in fact, acts as a preliminary dephenolator, and phenol thus removed should not be allowed to mix with the general body of effluent spent liquor from the plant. Devil liquor, which contains only traces of thiocyanate and thiosulphate, is suitable for evaporation at works where waste heat is available. At several works the devil liquor is now being successfully dealt with in this way, either by spraying it on the bars of the grates of the gas producers in the retort house or into the retort-furnace flue at a convenient point.

At works A, above, the volume of the devil liquor is 10 p.ct. of the total effluent from the plant. Of the total phenol in the effluent liquors dealt with, 27 p.ct. is in the devil liquor withdrawn for evaporation, and 73 p.ct. in the still effluent proper. The oxygen-absorbed figure for the total effluent is thus reduced from 835 to 780, or 55 parts per 100,000—a reduction of 6½ p.ct.

The beneficial effect that results from the evaporation of the devil liquor is much more marked in the case of liquors from vertical retort working, as the phenol content is here much higher. Thus, at a works in the Midlands, where evaporation of devil liquor is now practised, the total oxygen-absorbed figure shows a reduction from 855 parts to 665 parts per 100,000—190 parts in all, or 22 p.ct.

Calculation shows that in normal working, and with the relative volumes of devil liquor and still effluent liquor usually met with in vertical retort practice, the removal of 40 to 50 p.ct. of the total phenol might be effected by evaporation, with a reduction in the total oxygen-absorbed figure of 20 to 25 p.ct.

Thiocyanate.

Authorities differ as to the origin of the thiocyanate present as a normal constituent of ammoniacal liquors. Undoubtedly a proportion of the thiocyanate is due to the interaction of carbon bisulphide with ammonia or with ammonium polysulphide; but, as already indicated in the 1923 report, there are reasons for regarding thiocyanate, in the main, as an oxidation product due to interaction of oxygen, ammonium sulphide, and cyanide in the cooler parts of the condensing system, where conditions favour the formation of ammonium polysulphide.

If this be so, it should be possible to effect substantial reduction in the thiocyanate content of the liquor by reducing the oxygen and cyanide content of the crude coal gas entering the washers and scrubbers, and by protecting the liquor from undue contact with air during storage. The removal of the cyanide would have to be effected by the adoption of one or other of the various cyanogen recovery plants.

Reduction in the oxygen content of the crude coal gas would necessitate both increased care to prevent in-leakage of air at the retorts, and admission of air under pressure at the purifiers, in place of at the exhausters, at works where it is customary to admit a fixed proportion of air to promote revivification. In this connection, it is interesting to note that one authority contends that an amount of oxygen in excess of 0·3 p.ct. is never absorbed from the gas in the purifiers; and as 0·2 to 0·4 p.ct. of oxygen is present in the gas, further admission of oxygen is uncalled for. (See Alwyne Meade, "Modern Gas-Works Practice," 2nd Edit., p. 580.)

Experiments are now in hand at various gas-works, but data are lacking, to determine the full effect of working on the lines indicated above. The matter will be made the subject of further research during the coming year.

Effect of Removal of Cyanide from Crude Coal Gas.

—	Cyanide Recovery Plant.	Air Admitted to Crude Gas.	Thiocyanate as CNS per 100 Pts.	Remarks.
A. Williams Process .	Working	None	0·05	In spent liq.
B. Brit. Cyanide Co.'s Process—				
(*a*) Aug., 1923 . .	Not working	At inlet to exhausters.	0·300	,,
(*b*) April, 1924 . .	Working	At purifiers	0·165	,,
(*c*) Oct., 1924 . .	,,	,,	0 235	,,
(*d*) Feb., 1925 . .	,,	,,	0·165	,,

Note.– Expt. B (*b*) corresponds to a period when the cyanide washer was working steadily; 3 p.ct of C.W.G. was then being added to the crude coal gas.
Expt. B (*c*) relates to a period when the washer was working badly; 18 p.ct. of C.W.G. was then being added.
Expt. B (*d*) conditions of working remodelled by placing a steam coil in the cyanide washer to increase the temperature, which was unduly low; the percentage of C.W.G. was 13.
When in use, the cyanide recovery plant at Works B follows the tar extractor, which is of an efficient type.

Attention was drawn in the 1923 report to the relatively small amount of thiocyanate obtained in the liquor condensing in the "atmospherics" (atmospheric condenser and water-tube condenser); and the suggestion was made that the character of the united liquor might be improved were extra cooling power provided, to increase the volume of relatively "good" liquor separating at this point. Experiments on these lines are now in progress at a large gas-works in the North of England, and the preliminary results are encouraging.

Thiocyanate in Condensed Liquor from Purifiers.

Attention was directed in the 1923 report to the high content of thiocyanate in the purifier liquor, and its isolation for separate treatment was advised. Confirmation of the need for keeping a close watch on such liquor is afforded by the experience at a large gas-works in the Midlands, where a sample of condensed liquor from the purifiers gave an oxygen-absorbed figure of 3600 per 100,000 pts. The liquor from the boxes is now being isolated for separate treatment.

Thiosulphate.

Generally speaking, the conditions that favour the formation of thiocyanate also favour the formation of thiosulphate. A proportion of the thiosulphate is no doubt contributed by the liquor condensed in the retort house, but thiosulphate is essentially an oxidation product. Reduction in the oxygen content of the crude coal gas and protection of the liquor during storage should assist in reducing the thiosulphate content of the ammoniacal liquor.

Colour-Producing Bodies and other Compounds (Difference Figure).

It will be seen on reference to the table of analysis already given that the difference figure for oxygen absorbed is relatively low in the case of liquor from horizontal retorts, and

relatively high in that from vertical retorts. This difference figure includes the higher tar acids, the colour-producing bodies, and all non-volatile oxygen-absorbing constituents other than thiocyanate and thiosulphate. Confining our attention to the case of liquors from vertical retorts, it will be apparent that removal from the liquor of higher tar acids and other constituents represented by the difference figure in the analysis is, next to the removal of the phenol itself, the most urgent problem that confronts the gas engineer who seeks to improve the character of his spent liquor. It is also the most difficult; and little advance would appear to be possible in this direction unless the gas engineer is able to effect radical alteration in the method of separating the tar from the crude coal gas in its passage from the retort house to the purifiers.

Consideration of analytical results given in Appendix B of the 1923 report clearly indicates that the impurities under review separate mainly at the hot end of the system, and are derived in great measure from the tar. Thus:

Difference Figure (including Colour-Producing Bodies), expressed as O/A, Pts. per 100,000.

—	Retort House.	Atmospherics.	Scrubbers.
Horizontal retorts	120	150	15
Vertical retorts	425	225	25

Contact of tar and liquor in the condensing plant and storage wells undoubtedly promotes solution of these objectionable constituents by the ammoniacal liquor. The point was fully discussed in the 1923 report. Striking confirmation of the correctness of the views there expressed is afforded by the following figures, kindly supplied by the manager of a large gas-works in the Midlands, where vertical retorts are in operation.

Ammoniacal Liquor from Storage.

	Total Oxygen Absorbed. Pts. per 100,000.
(1) Liquor stored five weeks in contact with tar, with frequent disturbance	900
(2) Liquor distilled practically as made, towards end of run	500
(3) Liquor (2) after further four weeks in well	850

Complete separation of tar and liquor as made, and their subsequent storage in separate wells, would therefore appear to be the first step necessary for the production of a better-class liquor.

Attempts have been made to effect a partial removal of the colour-producing bodies by treatment of the hot alkaline liquor from the still by blowing with fire-gases rich in CO_2, followed by addition to the treated liquor of a proportion of alumino-ferric coagulant. Blowing with fire-gases in this manner was found to be a necessary preliminary to treatment of the liquor in the dephenolating scrubber at works where the spent liquor was highly charged with free lime, as separation of lime salts in the scrubber was a serious cause of blockage. Results, however, have so far been disappointing. While some improvement in colour was noticeable, on occasion, when a sufficient excess of free lime was present and abundant separation of carbonate ensued on blowing the liquor with fire-gases, the O/A figure (apart from the effect produced by the volatilization of a portion of the phenol) showed little reduction. Thus, in a large-scale experiment conducted at one of the gas-works where 12 lbs. of alumino-ferric were added per 10,000 gallons of effluent, after prior treatment of the hot liquor with fire-gases in the settling pit, the following results were obtained:

	Reduction Effected. P.Ct. of Total Entering.
Total alkalinity reduced by	53
Phenol ,, ,,	14
Thiocyanate ,, ,,	*Nil*
Thiosulphate,, ,,	*Nil*
Colour-producing bodies	40
Oxygen absorbed (4 hrs.)	4

The compounds referred to appear to be wholly non-volatile in the dephenolating scrubber. Thus:

—	Before Treatment.	After Treatment.
Difference figure, in terms of O/A, pts. per 100,000	340	345
Colour producing bodies, relative depth of colour produced in test	100	100

Laboratory results were confirmatory of those obtained at the works. We are driven to conclude, therefore, that little improvement in the character of the liquor, *qua* higher tar acids, &c., is possible, unless the tar fog can be thrown down at the hot end of the condensing system, and tar and liquor kept strictly apart in the storage wells.

In this connection, the experience obtained at direct recovery plants of the "Otto" type should be of value. It has there been found possible, by spraying the crude oven gas with liquor (now used in place of tar as formerly) at a temperature above the dew-point of the gas, to effect removal of 90 to 95 p.ct. of the tar, with the production of a relatively small body of liquor rich in fixed ammonium salts, and by no means unduly contaminated with colour-producing bodies. The temperature of the gases entering the spray is 130° to 135° C., and the gases are reduced on leaving the spray to a temperature of 70° to 75° C.; the actual dew-point being 60° to 65° C. The liquor from the tar extractor (replenished, as required, with virgin liquor taken from the condensing main) is circulated from a store tank until it has attained the desired strength. It is then withdrawn, settled, and evaporated for recovery of the ammonium salts.

The system was made the subject of an address by G. T. Purves at the Institution of Gas Engineers in June, 1914. Liquor has been found to be more effective than tar as a spraying medium. With such a spray, Purves states, there is complete separation of heavy tar from gas while the temperature is still between 70° and 80° C., and with practically no extraction of light oils—low-boiling constituents, the presence of which in due proportion at a later point in the condensing system is essential for removal of naphthalene in gas-works practice (Alwyne Meade, "Modern Gas-Works Practice," 2nd Edit., p. 450). Purves states that the one important factor is that the gas shall reach the tar-extracting plant at a temperature not lower than the dew-point. He sees no difficulty in applying the same principle to vertical retort practice.

Through the courtesy of the works managers, I was furnished with samples of the sprayer liquor from two coke-oven works where the "Otto" spray is in operation. The liquor from Works A is relatively weak when withdrawn for evaporation; at Works B a high-strength liquor is produced.

It will be noted in the case of both works that the difference figure for oxygen absorbed is relatively low (188 and 190 respectively). The colour test figures are also low (0·03 for Works A and 0·05 for Works B). In spent liquor from ammonia stills operating on vertical retort liquor difference figures of 300 to 400 are not uncommon, with a colour test figure of 0·5 to 0·6.

Removal of Tar from Crude Gases of Coke Oven Works, by Ammonia Liquor Spray.

—	Liquor from Tar Extractor.	
	Works A.	Works B.
Character of liquor	Claret coloured, clear.	Claret coloured, clear.
Composition, pts. per 100:		
Chloride, cald. as HCl	1·5800	6·550
Ammonia: Free	0·1050	0·120
Fixed	1·2200	4·960
Total	1·3250	5·080
Sulphide, cald. as H_2S	*Nil*	*Nil*
Cyanide, cald. as HCN	0·0030	*Nil*
Phenol, cald. as C_6H_5OH	0·1695	0·119
Thiocyanate, cald. as CNS.	0·0950	0·265
Thiosulphate, cald as S.	0·4200	2·150
Sulphite, cald. as S	0·0130	0·020
Colour-producing bodies cald. as $C_6H_4(OH)_2$	0·0300	0·050
Oxygen absorbed, pts. per 100,000 (4 hrs. test):		
By phenol, equivalent to	300	210
Thiocyanate, ,,	80	220
Thiosulphate, ,,	360	1,840
Sulphite, ,,	7	10
Other forms (including colour-producing bodies) by difference	188	190
Total found	935	2,470
Fixed ammonia, pts. per 100:		
As Thiocyanate	0·028	0·080
Thiosulphate	0·225	1·140
Sulphite	0·015	0·020
Chloride	0·740	3·050
Other forms (including sulphate) by difference	0·212	0·670
	1·220	4·960

Tar removed by sprayer, p.ct. of total	90 to 95
Volume of liquor used, p.ct. of total made	4 to 5
Pressure at sprayer	80 lbs.

There is reason to connect the low difference figure for oxygen absorbed with the presence of fixed ammonium salts in the sprayer liquor. Laboratory experiments show that free ammonia in ammoniacal liquor favours the emulsification of tar and the extraction of oxygen-absorbing constituents, when

tar and liquor are shaken together; fixed salts of ammonia, on the other hand, have a contrary effect. Thus:

Effect of Ammonia in Promoting, and of Ammonium Sulphate in Retarding, the Extraction of Oxygen-Absorbing Constituents of Crude Coal Tar.

120 c.c. of Solution Shaken with Tar at 50° C. for 3 Minutes in Flask.	Character of Liquor Obtained After Settling Out Tar.	Colour-Producing Bodies, Calculated as $C_6H_4(OH)_2$. Pts. per 100.	Oxygen Absorbed. (3 mins. 27°). Pts. per 100,000.
A. Coke-oven tar (from liquor sprayer tank):			
(*a*) Ammonium sulphate solution (2 grms. ammonium sulphate) 10 grms. tar	Clear, colourless	*Nil*	75
(*b*) Ammonia solution (0·85 grm. NH_3) 10 grms. tar . .	Turbid, brown	0·003	140
B. Horizontal-retort tar (from storage well):			
(*a*) Ammonium sulphate solution (2 grms. ammonium sulphate) 10 grms. tar	Clear, faint brown	0·01	165
(*b*) Ammonia solution (0·85 grm. NH_3) 10 grms. tar . .	Turbid, brown	0 01	265
C. Vertical-retort tar (from storage well):			
(*a*) Water only, 10 grms. tar	Clear, brown	0·10	265
(*b*) Ammonium sulphate solution (2 grms. ammonium sulphate):			
(1) 10 grms. tar . .	Clear, faint yellow	0·10	260
(2) 10 ,, ,, . .	,,	0·10	260
(3) 50 ,, ,, . .	,,	0·35	495
(*c*) Ammonia and ammonium sulphate (2 grms. ammonium sulphate):			
0·2 grm. NH_3, 10 grms. tar	Clear, brown	0·10	270
0·85 grm. NH_3, 10 grms. tar	,,	0·10	298
(*d*) Ammonia solution (0·85 grm. NH_3):			
(1) 10 grms. tar . .	Turbid, brown	0·10	425
(2) 10 ,, ,, . .	,,	0·10	430
(3) 50 ,, ,, . .	,,	0·55	1065

The question arises: Is the increase in the oxygen-absorbed figure due merely to the greater solubility of phenol in the liquor when free ammonia is present to combine with it, or are other compounds extracted—non-volatile in the distillation test for phenol, but capable of absorbing oxygen from permanganate, and returned in the analysis as "other forms (including colour-producing bodies)?"

To determine the point, 25 grammes of vertical-retort tar were shaken with 240 c.c. of solution at 50° C. After settling, the oxygen-absorbed figure was determined—(*a*) total figure (phenol and other forms); (*b*) phenol alone. Analysis indicates that free ammonia favours the extraction of both classes of compounds, but especially those included in the figure for "other forms." Thus:

	Ammonium Sulphate Solution.		Ammonia Solution.	
	Oxygen-Absorbed. Pts. per 100,000 (3 Mins. Test).	Colour-Producing Bodies. Calculated as $C_6H_4(OH)_2$. Pts. per 100.	Oxygen-Absorbed. Pts. per 100,000 (3 Mins. Test).	Colour-Producing Bodies as $C_6H_4(OH)_2$. Pts. per 100.
Due to phenol	210	..	310	..
Due to other forms . .	75 (by diff.)	0·10	210 (by diff.)	0·15
Total found.	285		520	

Experience in America, in coke-oven practice, with the working of the "Doherty" washer-cooler, is stated to be favourable to the quick removal of tar by spraying with liquor at the point of highest temperature—see paper by R. B. Rowley to the Michigan Gas Association, entitled "Developments in the Doherty Washer-Cooler as a Gas Condenser" ("American Gas Journal," October, 1915, p. 231).

There would appear to be no fundamental objection to applying the same principle of tar separation to the vertical retort system. It should not be difficult to fix the spray at a point where the temperature would exceed the dew-point of the crude coal gas, and to feed the spray with liquor rich in ammonium salts and with a free ammonia content not exceeding 0·1 to 0·2 p.ct. NH_3. The volatilization of water into the gases at the sprayer should throw no extra work on the condensing system, as the temperature of the crude gas would be lowered in proportion to the amount of water vaporized. A due proportion of the liquor deposited in the hot section of the main immediately following the spray would have to be returned to the circulating tank from which the spray was fed. The volume of liquor ultimately withdrawn for recovery of the fixed ammonia contained therein would be relatively small compared with the total body of ammoniacal liquor produced. Crude coal gas from vertical retorts is relatively poor in naphthalene and relatively rich in low-boiling constituents; and this would ensure an adequate supply of solvent oil for the naphthalene at critical points (Alwyne Meade).

Other methods for the removal of tar fog by "shock" treatment at the hot end of the system would be the use of a "Cyclone" tar separator or one of the centrifugal type. Works experiments on these lines are now in progress.

BIOLOGICAL TREATMENT OF EFFLUENT BY FILTRATION THROUGH MATURED COKE.

The practicability of purifying effluent spent liquor by oxidation on bacterial filters was fully discussed in the report for 1923. No further work was done on the subject during the past year.

THREE-PART SYSTEM OF CHARGING FOR GAS.

In the course of an address to the National Gas Association, in America, Mr. Henry L. Doherty alluded to the three-part system of charging for gas—a method to which his name is applied. He urged that this basis, with a proper allocation to expenses, enabled them to supply any sort of load at a profit. The question was, however, how the general adoption of the three-part rate could be secured, when in many cases it would raise the bills of more than two-thirds of the customers. "We can," he said, "show that we do not, even at the start, have to collect any larger sum of money from our consumers as a whole than we now collect; and we can show that the mere adoption of the system brings a continuing increase in profitable business, thereby making it possible to serve our consumers as a whole better, and at a lower cost. The consumers who are adversely affected are apt to object strongly, although they are entitled to no consideration; and the gas men have always been too timid in their efforts to enforce rational methods of charging. If we could develop a widespread belief among gas men that it was a duty they owed to the public to enforce a fair and equitable rate, we might make more progress. It is our duty to the public to do this; and we shall never be able to realize our opportunities, either for our industry or for the public generally, until we universally adopt the three-part rate."

This method of charging has been referred to on several occasions in the "JOURNAL," and was briefly described by Mr. G. M. Gill during some observations on gas-works practice in America which he made some time ago before the London and Southern District Junior Gas Association. He explained that, under this system, a consumer first of all has to pay a consumer's charge; and this may be something like 30s. or 40s. a year. Every consumer has to pay this. It is based upon the actual cost involved in supplying him, and includes such things as the reading of, and attending generally to, meters, making-out the accounts, and quite a number of items of expenditure which the supplying of a consumer entails whether he uses much or little gas. After the consumer's charge comes the maximum demand charge. Each consumer has to state the maximum amount of gas he is going to take in any hour; and then he is given a limiting meter—which is really a governor—that does not allow him to take in one hour more than the maximum amount of gas declared. Say, for example, a consumer states that he is not going to use more than 100 c.ft. of gas an hour, he might have to pay as much as 2s. for each cubic foot per hour, making £10 a year. Having paid these two charges, the consumer then gets the gas itself priced-out at a very low figure. Thus, if he uses a great deal of gas, it will work-out more cheaply than if he uses a little.

The "Empire" demand meter, made at the Metric Metal Works of the American Meter Company (Inc.), of Erie, automatically controls or limits the maximum rate of flow of gas which the customer can draw from the distributing system, and delivers the gas at a uniform pressure for all rates up to the maximum demand that he has contracted for.

Paint for Boiler Fronts.—Writing in "Power," Mr. T. Pascoe expresses the opinion that its use for boilers is the hardest test that paint can be put to, because some parts of the steel and cast iron are only warm, while others are raised to a high temperature. When the paint is applied, the boiler should be out of service. For a number of years he has had experience of the use of graphite plumbago mixed with water to a consistency of paint. It is applied with a paint brush, and allowed to dry, and is then polished by using waste or a polishing cloth. It requires but little rubbing, takes on a smooth finish, and gives a blue colour. This finish will stand indefinitely, and all that it requires is a dusting.

LABOUR ALLIANCE DRAFT CONSTITUTION.

The draft constitution for the new Labour Alliance as issued for ratification to the Unions concerned—embracing some 3,000,000 members of the mining, railway, transport, engineering, and shipbuilding industries—is divided into fourteen clauses. The government is to be entrusted to a General Conference and an Executive Council on which each allied organization will have representation in proportion to its membership. On receipt of a definite request for assistance, the Secretary will convene the Executive Council to examine the facts and circumstances. If in their judgment action is warranted, the Council will call together the General Conference, which must give authority before action is taken. The forms in which assistance may be granted are: (*a*) Negotiation. (*b*) Financial. (*c*) Partial sympathetic action. (*d*) Sympathetic action by stages. (*e*) Complete sympathetic action. Membership of the Alliance involves complete submission by the allied organization to its decrees. To meet administrative costs each allied organization will be expected to contribute 5s. per 1000 members per annum, or such other sum as the General Conference may determine.

LINES OF OPERATION.

The Sub-Committee who were appointed to evolve a scheme state that their view is that the assistance of the Alliance can be called in on any or every dispute arising, but should be limited to really vital national or general matters. An invitation to join the Alliance has been issued to the Iron and Steel Trade Confederation; and to make the Alliance effective, it has been found necessary to provide for the incorporation of men employed in the generation and distribution of power in its various forms. Some of these would be automatically allied; but the Electrical Trades Union has been invited, and has accepted. As to what might happen in the event of a dispute, the Committee say it may be found an impracticable proposition to have a universal order of stoppage, and indeed it might be unnecessary. It would depend in the main upon the character of the dispute and the strength of the opposition. It may be that if one or other of the societies was involved in a dispute, it would be unnecessary to bring out the sections who would in fact be of no economic assistance. The position would have to be examined, to decide where economic pressure is necessary, and definitely advise the Conference. It might be advisable then, instead of bringing out the whole of the members at one time, to do so in sections, and so encourage and support the men really involved in the dispute.

ATTITUDE OF UNIONS.

The Transport and General Workers' Union at their Conference at Scarborough accepted the draft constitution for the new Labour Alliance; but this is subject to confirmation by the membership at branch meetings. The General Secretary (Mr. Ernest Bevin) has expressed the hope that the branch meetings will carefully consider the matter, so that it cannot be said, when called upon to act, that they were brought into the Alliance under false pretences. Another point explained on the occasion was that, in the event of ratification, the power would pass into the hands of the Executive of the Alliance for the conduct of any particular dispute. It is understood that the "N.U.R." propose to draft amendments, and that body will only join the Alliance on the understanding that unity is first obtained among the railwaymen's organizations. The "A.E.U." is similarly inclined to accept the provisions, so long as the craft unions embraced in the engineering trades are ready to encourage industrial amalgamation.

Income-Tax Tables.

A copy of the new edition of the useful folded card, issued by Messrs. Oliver & Boyd, of 33, Paternoster Row, E.C. (price, by post, 1s. 1d.), giving a tabular view of income-tax information from 1842 to 1926, has been sent to us. The aim is to present the income-tax and super-tax positions in an intelligible and, as far as possible, tabular form. The subject has become so complicated that it requires an expert to understand even ordinary books dealing with it. This publication is designed to remove that difficulty, and to serve the purposes of both experienced and inexperienced people. This is done by various tables. The different heads of abatement are tabulated with their conditions and money value, and in this, as in other respects, the particulars cover all the points up to date, including this year's Budget. Sixteen pointed paragraphs of "Reminders and Advice" are an epitome of the legal position in popular language, supplemented by a statement of nearly forty heads of repayment claims.

Farm Notes on Profitable Farming.—We have received from the British Sulphate of Ammonia Federation, Ltd., of Nos. 28-30, Grosvenor Gardens, S.W., a copy of the No. 4 issue of "Farm Notes on Profitable Farming," which has just been published. It is a practical and useful publication, edited by Mr. T. H. J. Carroll, B.Sc. (Agric.), F.R.H.S., which is issued several times a year; and the Federation distribute 25,000 copies of each number free to farmers, merchants, and others interested in agriculture.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Dr. Carpenter and the Reduction of Costs.

SIR,—There is a saying in America that the engineer is a person who is able to do with one dollar what other people could only do with two. In other words, price is the ultimate factor by which efficiency in production must be judged.

If Mr. Hardie will again turn to, let us say, the last five volumes of "Field," he will find therein some very startling figures as to the extra amount the gas consumer has had, in similar circumstances, to pay in North, as contrasted with South, London.

CHARLES CARPENTER.

South Metropolitan Gas Company,
709, Old Kent Road, S.E. 15,
July 27, 1925

SIR,—Dr. Carpenter's evidence before the House of Lords Committee on July 14, and his depreciatory remarks regarding the Gas Light and Coke Company and the Sheffield Gas Company, have occasioned considerable surprise. They have drawn from Mr. T. Hardie, the Chief Engineer of the Gas Light and Coke Company, a complete refutation so far as his Company is concerned; and in these circumstances, as a matter of justice, it may not be out of place to give the working results referred to, taken from "Field's Analysis," of all three Companies.

—	Sheffield Gas Company.	Gas Light and Coke Company.	South Metropolitan Gas Company.
	Pence.	Pence.	Pence.
1920	8·394	10·627	9·323
1924	5·077	7·509	7·686
Improvement in working	3·317	3·118	1·637

Comment is superfluous.

RALPH HALKETT,
General Manager and Secretary.

Sheffield Gas Company,
July 27, 1925.

Bitumen v. Tar.

SIR,—The letter which you print in your issue of the 22nd inst. over the signature of "Motorist" seems to call for a reply. Like him, I am interested (having driven cars some 300,000 miles) in the improvement of roads; but, unlike him, having been more or less responsible for the sale for road purposes of some 300,000,000 gallons of tar preparations, I am not disinterested in the financial side. Unlike him, again, I feel rather strongly, with you, that British goods should have the preference.

Still more unlike him, I know something of the subject. I know, for instance, that crude tar is not used in making roads, except by those who ought to know better; that even the best refined tar is cheaper than bitumen; that a road made with tar is cheaper than a road made with bitumen; that it is a fairly safe bet that, if a waterproofed road be "skiddy" or potholed or wavy, that road is made with bitumen; and I think, Sir, that I also know the answer to the awkward questions which you asked in a recent leading article.

It is, perhaps, not generally understood that each extra penny obtained for tar by a gas-works makes its coal worth a shilling a ton more, or that the same gain in price by a coke oven knocks quite a few shillings off the cost price of steel. Surely "Motorist," if he be really disinterested, and, if he be an Englishman, even if he have no regard to the millions of ratepayers who own gas undertakings, or the millions of shareholders in gas companies, steel companies, and collieries—to say nothing of the men who are, or ought to be, employed in these concerns—would prefer that his money, and the money of his fellow motorists and ratepayers, were spent on British goods rather than in Mexico, and for the benefit of British industry rather than for the enhancement of the dividends of foreign oil companies.

If the day comes when the British public are as careless of British interests as are the officials of the Ministry of Transport, then, Sir, we shall indeed be in a parlous state.

HERBERT W. ROBINSON.
Chairman, Midland Tar Distillers, Ltd.

Exchange Buildings,
Stephenson Place, Birmingham,
July 25, 1925.

SIR,—While the people of this country admittedly exhibit a woeful lack of that sense of commercial patriotism which characterizes other nations, it is difficult to believe that the English motorist (in spite of the number of foreign motor vehicles which one sees) is less patriotic than other sections of the community. For this reason, exception must be taken to one of the statements of "Motorist" in his letter appearing in your issue of the 22nd inst.

It is, of course, evident that the price and quality of materials used in road making are important considerations; but it cannot be admitted that "the source of the material used" is not of importance. The present state of British industry, as you have yourself time and again stressed, makes it more than ever essential that no foreign material should be imported if home-produced material equally suitable is available at a reasonable price. It is submitted that to permit the importation of road-making materials at the present time is little short of a national crime.

Your correspondent would appear not to have appreciated fully

the reasons put forward for using tar. The foremost is that tar is a home-produced material. This claim, although it carries (or should carry) considerable weight, by no means stands alone. If tar were unsuitable for the purpose, or if it cost considerably more than imported substitutes, the position would be quite different; but not only is tar capable of making roads as suitable as any in existence to-day, but tar costs considerably less than the foreign material. Claims are occasionally made that, although a tar-macadam road costs less in the first instance, the cost of maintenance outweighs this advantage. Evidence in support of such a claim has yet to be adduced, and experience tends to show that proof will not be forthcoming.

If we regard the matter from the point of view of the motorist—who has to pay a large proportion of the cost of road construction and road maintenance—is he satisfied that our "corrugated" roads represent a laudable achievement in road construction? A tar-macadam road does not readily adapt itself to the "permanent wave." Again, during the interval that elapses between the making of the road and the development of the corrugated effect, does the motorist contend that the highly polished surface is ideal?

What are the lessons already learnt from the newly-made arterial roads? An initial expenditure far greater than would have been required had tar-macadam roads been laid has had to be followed by further heavy expenditure in order to render these arterial roads fit for their primary function—viz., to carry traffic safely. Safety is being achieved, it is understood, by the eleventh-hour use of tar as a top dressing. One lesson, therefore, would appear to be that very large sums of money may be saved, and safety ensured, by the use of tar-macadam in the first instance.

The Roads Improvement Bill will doubtless have received the Royal Assent before Parliament adjourns. One of the provisions of the Bill is to enable the Minister of Transport to conduct experiments in order to test the effect of different types of vehicle on different classes of road. When the Bill was in Committee in the House of Commons, the Minister indicated that these experiments would probably be conducted through the agency of organizations such as the Automobile Association and the Royal Automobile Club. The responsibility placed upon those entrusted with the conduct of these experiments will be considerable; but we may hope that one of the results will be to satisfy motorists that the nation can combine commercial patriotism with sound common sense.

BRITISH ROAD TAR EXHIBIT COMMITTEE.

28, Grosvenor Gardens, S.W. 1,
July 25, 1925.

REGISTER OF PATENTS.

Coke Ovens.—No. 235,250.

BECKER, J., of Pittsburgh.

No. 952; Jan. 12, 1924.

This invention relates to coking retort oven batteries with coking chambers or retorts alternating with heating walls, and with reversible regenerators. The invention has for its primary object to simplify the system of flow of the heating gases through the heating walls and the regenerators. The invention consists broadly in the heating walls containing vertical flues organized for upflow of heating gases concurrently through all the flues of the next heating wall, and horizontal flues into which the vertical flues port at their upper ends. Several cross-over ducts are provided extending over a single coking chamber. These branch from each horizontal channel connected with upflow flues to a horizontal channel in the next heating wall, which is connected with downflow flues.

Distillation of Coal.—No. 235,375.

WADE, H., of London.

[A communication from A. STREPPEL, of Berlin.]

No. 13,094; May 28, 1924.

This invention relates to ovens used in the distillation of coal. The particular type of oven which it is claimed to improve by the present invention is that which comprises a heating flue having vertical side walls and vertical rows of louvres spaced from the walls, by means of which a thin layer of the material to be treated can be fed downwardly in contact with the walls of the flue; the distillation gases having direct access to the free space in the oven through the openings between the louvres.

According to the present invention the heating flue is suspended within the oven envelope solely at its inlet and outlet ends, which are of reduced cross-sectional area; the support being such that the top, bottom, end, and side walls of the heater are out of contact with the envelope.

By supporting the heating flue in the way described, the material under treatment has access to the top, bottom, end, and side surfaces of the flue proper. In this manner, states the inventor, the maximum contact surface between the material under treatment and the heating flue is obtained; risk of leakage due to expansion of the parts is reduced to a minimum, and the direct conduction of heat from the flue along the connected adjacent parts of the oven envelope is reduced.

The heating flue preferably comprises a plurality of horizontally-disposed sections connected together one above the other, through which sections the heating medium flows in a sinuous path; the top and bottom sections being provided with outlet and inlet openings respectively connected to one of the end walls of the envelope. The separate sections may be made of corrugated metal. The oven envelope is preferably divided into separate sections by means of horizontal partitions extending inwardly from its walls to the louvres, so that the apparatus may be used for fractional distillation processes.

The uppermost horizontal section of the flue may be provided with perforations permitting the heating medium to flow outward through the material under treatment and into the free space in the oven. The upper and lower surfaces of the flue sections may be tapered, to facilitate the feeding of the layers of material over the walls of the flues.

Gas and Coke from Bituminous Fuel.—No. 235,958

POWER-GAS CORPORATION, LTD., and RAMBUSH, N. E., both of Stockton-on-Tees.

No. 7750; March 26, 1924.

This invention relates to a process for producing combustible gas (of the so-called mixed-gas type) and coke from bituminous fuel at average lower temperatures than hitherto usual.

The object of the invention is to produce, apart from the mixed gas, a maximum yield of low-temperature tar, ammonia, and coke, and to carry out the operations in such a way that a mass of semi-coke is continuously maintained in the lower zone of the fuel column in an easily reactive incandescent condition. This is effected by dispensing with the usual down-steaming and by continuously withdrawing coke from the lowest part of the fuel zone at such a rate that up-steaming only can be maintained without substantially displacing the zone of reactivity. Moreover, say the patentees, by carrying out the process in this manner, the active semi-coke can be brought to the proper reactive condition without reaching the high temperature which usually prevails in the normal up and down steaming processes.

A shaft generator, which is illustrated and described in detail in the specification, is used; and bituminous fuel is charged at the top, mechanically or by other means, and the fuel is caused to descend by continuously discharging from the bottom the coke formed.

Instead of the usual five stages, substantially only three stages are used. The first stage consists in "hot-blowing" for 1 to 1½ minutes, during which the highly reactive semi-coke formed in the lower zone of the fuel column is blown into incandescence, while the so-called blow-gases are discharged at or about the middle of the column of the fuel. In the second or scavenging stage, steam is admitted until water gas commences to issue through the blow-gas outlet ports. The period of this scavenging may vary from 10 to 50 seconds.

In the third stage, the cold-blowing period, the highly reactive incandescent semi-coke is steamed by an ascending current of steam for 4 to 5 minutes, the water-gas produced in an intensely hot state ascends through the upper zone of the shaft generator, and gradually distils the descending bituminous fuel under low-temperature conditions. The water gas issues from an outlet near the top of the generator, and carries with it the rich distillation gases. Simultaneously with the successive carrying-out of the operations in these three stages, the fuel is caused to descend by continuously withdrawing the coke formed from the lowest part of the fuel zone at such a rate that the tendency of the ascending blast to force the incandescent zone to the fuel is too far up the fuel column is counteracted, and the zone of incandescent highly reactive semi-coke is continuously maintained practically stationary near the bottom of the shaft generator.

The coke may be removed by a revolving table provided with knives, with a plurality of pockets arranged below them. The knives serve for cutting through the coke mass and for pushing displaced coke into the pockets, which are so arranged that while one pocket is being filled the others can be discharged.

The patentees put forward the following figures (the results of long-period operations) to substantiate the claimed advantages.

—	Present Invention.	Gas-Works Retorts.	Ordinary Bituminous Water-Gas Plant.	Water Gas Using Coke.
Gas per ton, c.ft. . .	29,000	18,000	60,000	60,000
B.Th.U., c.ft. . . .	390	450	335	300
Coke, lbs.	1,000	1,200	*Nil*	*Nil*
Sulphate, lbs. . . .	35	25	40	*Nil*
Tar, gallons . . .	15	12	12	*Nil*
Thermal efficiency (excluding steam) . .	85·1	82·3	74·3	72

Gasholder Crown Framing.—No. 235,962.

MILBOURNE, R. J., of Lilleshall, and CUTLER, S., of Victoria Street, S.W. 1.

No. 7840; March 27, 1924.

Remarking that in gasholders, as heretofore constructed, the crown framing for supporting the top sheets has been of the "French" roof truss or the "bow-string" truss type, the patentees point out that in the former case the main tension rod is merely an extension of the rafter truss tension rod and extends from the king-post strut to the truss plates secured to the lower end of the centre column. In the latter case the main tension rod is independent of the main rafter; and, as it must miss the bottom tension rod of the rafter, it assumes an inclination which necessitates the lengthening of the centre column. Such lengthening is, in practice, frequently inconvenient, particularly in cases where the holder is erected in a brick or concrete tank; and moreover, since the centre column is in compression, its increased length requires that it shall be correspondingly strengthened.

In a suitable construction of crown frame embodying the present invention, the main rafter is supported or stiffened by a bow-string truss composed of struts of different lengths and a tension rod, preferably in the form of a flat or round steel rod. The main ten-

sion rod is formed of two flat bars for a distance enabling the rafter trussing to pass between them, after which it is continued as a single rod the end of which is attached to the truss plates of the centre column, and which may be fitted with a screw-coupling for purposes of adjustment.

As will be understood, this design of the main tension rod enables its inclination, and consequently the length of the centre column, to be reduced. Furthermore, the truss of the rafter is held or guided between the two parts of the main tension rod, and is thus always retained in a vertical position, notwithstanding any tendency there may be due to unequal loading from wind, snow, or other cause, to deflect it.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 22.]

Nos. 17,839-18,418.

BARNES, A.—"Apparatus for quenching and discharging coke." No. 18,362.
BROADHEAD, R. W.—See Barnes, A. No. 18,362.
COKE & GAS OVENS, LTD.—"Neutralizing free acid in sulphate of ammonia." No. 18,027.
DAVISON, E. J.—"Water gas plants, &c." No. 18,044.
DEMPSTER & SONS, LTD., R.—See Barnes, A. No. 18,362.
EDWARDS, H.—"Manufacture of coke, &c." No. 18,271.
HISLOP, G. R.—"Gas-retort settings." No. 18,166.
HOMER, H. C.—"Gas-heated brackets for curling-tongs." No. 18,152.
PEARSON, R.—See Coke & Gas Ovens, Ltd. No. 18,027.
RODGERS, R. L.—"Carbonization of coal." No. 18,109.
SHEWRING, H.—See Davison, E. J. No. 18,044.
SMITH, T. B.—"Apparatus for drying and neutralizing sulphate of ammonia, &c." No. 17,895.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

South Metropolitan Gas Bill: Read the third time, and passed.

Bolton Corporation Bill: Returned from the Commons, with the amendments agreed to.

Statutory Gas Companies (Electricity Supply Powers) Bill: Returned from the Commons, with the amendments agreed to.

Stockton-on-Tees Corporation Bill: Reported from the Select Committee, with amendments.

Gas Regulation Act.

The drafts of the Special Orders proposed to be made by the Board of Trade under section 10 of the Act, on the applications of the Carlisle Corporation, Oswaldtwistle Urban District Council, Ormskirk and District Gas and Electricity Company, and the Aldershot Gas, Water, and District Lighting Company were agreed to on the 23rd inst.

The Brentwood, Northampton, and Southampton Gas Orders have been referred to the Special Orders Committee.

HOUSE OF COMMONS.

Progress of Bills.

Bolton Corporation Bill: Lords amendments considered, and agreed to.

Mansfield Corporation and Oldham Corporation Bill: Reported, with amendments, from the Local Legislation Committee.

STOCKTON-ON-TEES CORPORATION BILL.

This Bill, the purpose of which is to enable the Corporation to purchase by agreement the undertaking of the Haverton Hill-on-Tees Gas Company, Ltd., and to extend the limits of supply of the Corporation (see "JOURNAL" for Jan. 14, p. 83, and April 8, p. 129), was recently considered by a Committee of the House of Lords, presided over by Viscount FITZALAN OF DERWENT.

The extended limits of supply include the urban district of Billingham, part of which is now supplied by the Stockton Corporation, part by the Haverton Hill Company, and part by Messrs. Dorman Long & Co. from their coke-oven plant. The Corporation, however, do not wish to supply in the last-named Company's area unless the Company wish them to do so; and there is a provision in the Bill to enable the Corporation to enter into an agreement with the firm, or other persons who happen to be supplying gas within the new limits, to purchase the mains and pipes and the goodwill attaching to the business, or to pay compensation to those persons for giving up their rights of supply. The point before the Committee had reference to compensation to Messrs. Dorman Long & Co., and the goodwill of their undertaking.

Mr. ROWAND HARKER (for the promoters) said the Corporation asked that their limits of supply should be extended to include an area in part of which Messrs. Dorman Long & Co. are now supplying; but that the Corporation should not supply within Messrs. Dorman Long & Co.'s area until, by agreement, they had purchased the mains, pipes, and apparatus of that firm. Nothing whatever could be done without agreement. The petition of Messrs. Dorman Long & Co. pointed out that, although the Corporation sought powers to acquire by agreement the mains, pipes, and apparatus of the firm, there was no obligation upon them to do so, or to pay to the Company any compensation for loss of profit or for the sterilization of their gas undertaking. Apparently, said Counsel, the Committee were to be asked to place the Corporation under an obligation to purchase the mains, pipes, and apparatus. This was a position which the Corporation would find themselves unable to accept; but they were quite content to leave the Company as they were, and surely they could not reasonably ask for anything more. As to the suggestion that what the Corporation were seeking powers to do would tend to sterilize the firm's gas undertaking, Counsel said it was not unimportant for the Committee to bear in mind that it was a non-statutory undertaking. A non-statutory undertaking could not break-up public streets for the purpose of laying pipes to convey gas to consumers; neither, in strict law, could the local road authority assent to their so doing. It was done, of course; and no doubt in this particular case the local authority had said the Company could break-up the streets. The firm had no gas undertaking in the ordinary sense. What they had was a number of mains for giving a supply of gas, which, apparently, from their point of view, was a lucrative supply; and the Corporation had no desire whatever to interfere with them in this respect. Therefore, he asked the Committee to insert a clause which provided that the Corporation should not supply gas within the firm's area until they had purchased their mains, pipes, and apparatus, or so much of them as the firm might desire to sell, and to allow the Bill to proceed.

Mr. *Arthur Valon* (Messrs. W. A. Valon & Son, Civil Engineers, Westminster), who has been advising the Corporation in connection with the negotiations, expressed the opinion that the proposal of the Corporation with regard to Messrs. Dorman Long & Co.'s undertaking was perfectly fair. The firm were safeguarded from competition from the Corporation, who could not supply in the area until they had bought the undertaking. Presumably the firm would go on supplying gas within their area, unless they obtained a price from the Corporation which they were satisfied was fair. With regard to the imposition upon the Corporation of an obligation to purchase the gas undertaking of the firm, he knew of no precedent; and it would be most unreasonable here, because the gas was supplied from the Company's coke ovens, and it would be very difficult to find out in an arbitration what the undertaking was worth to the firm. The supply was only about 4½ million c.ft. per annum; and, apart from anything else, the cost of an arbitration would be more, probably, than the value of the whole concern. It would be impossible for the Corporation to take it over at a price including the cost of arbitration, and to supply gas in the area, except at a loss. It would be of no advantage to the Corporation or the public, or, as far as he could see, to the firm. The Corporation's present proposal met the suggestion of the Board of Trade, which was that if any part of the new limits of supply of the Corporation were supplied by a non-statutory undertaking, the Corporation should be restricted from supplying in that part until they had come to an agreement with the non-statutory undertaking.

Mr. F. J. WROTTESLEY, cross-examining, said there was no question of the firm trying to compel the Corporation to buy their business.

Witness replied that he was not previously aware of that.

Mr. WROTTESLEY suggested that, under the present proposal, if the Corporation agreed to buy the mains, and gave the firm nothing for goodwill or for compensation, the Corporation would have the right to supply in the Company's area.

Witness said the suggestion was that the Corporation should buy the mains and pipes of the Company at an agreed price, and clearly the firm could include in that price what they liked—goodwill or anything.

Mr. WROTTESLEY said the Corporation would hardly expect the Company, if they were making a profit out of the undertaking, to sell at a price which was merely the price of the mains and pipes.

Witness replied that he could not expect the firm to sell that part of their undertaking by agreement at a price which did not pay them.

Mr. WROTTESLEY put a number of further questions to show that it was necessary to make a definite reference to goodwill and compensation. He put forward a clause on behalf of the Company which was on the lines of the promoters' clause, but providing, in addition, that the Corporation should purchase the goodwill and pay compensation to the firm as a consideration for their having ceased to supply.

Witness asked how the Company were going to get anything for compensation.

Mr. WROTTESLEY said Mr. Valon had been connected with the Parliamentary Committee Rooms long enough to know that this was quite usual.

Witness replied that he had never known a Committee to direct how the value was to be arrived at, except the valuation was to be compulsory. He agreed that the Corporation need not buy. They wanted to buy, but not if they were bound to pay some compensation, whether the Company ought to have it or not. If the suggested clause were inserted, the Corporation must give the Company some compensation, whether they were entitled to it or not.

Mr. WROTTESLEY said that the Corporation, in their clause, named certain things, and thereby prejudiced the position.

Witness replied that the reason was that the Corporation were not buying works or an undertaking, but simply part of the mains, pipes, and apparatus. The firm had coke ovens, and presumably other apparatus at their works for making and supplying gas; but the Corporation could not buy those, and did not propose to. If the Company got a price which satisfied them for the mains, pipes, and apparatus, it did not matter what they called it—whether pipes, mains, or compensation.

Lord GLENTANAR (a member of the Committee) suggested that it would be simple, on settling compensation, to take a nominal return

on the amount of gas the Company were supplying, and to capitalize that.

Witness replied that it would be if the Corporation proposed to take the whole works; but they did not.

In re-examination, Mr. Valon said that under the Corporation's clause they were not precluded from paying anything for goodwill; but if they were directed to do so, they must. He saw no objection to the provision that the Corporation should purchase the goodwill and pay compensation "if any."

Mr. WROTTESLEY said the words "if any," if put in, would be much more likely to cause an unreasonable suspicion than if the words were put in that the Corporation were to buy the goodwill. If the Committee had doubts that the firm had any goodwill, he could call evidence on it; there were several hundreds a year involved. He had two precedents for the words he asked should be inserted. These were the Ashington Urban District Council Act of 1914—it was true that that was a compulsory sale—and the Annfield Plain Act. If the Stockton Corporation bought, they should pay compensation for goodwill. He asked the Committee not to include the words "if any," because they implied a doubt in the minds of the Committee.

Mr. ARTHUR MOON, replying on behalf of the Corporation, said that if the Corporation were taking compulsory powers to buy-out the Company's works, Parliament would say, of course, that the Company must be paid compensation for the loss of their business. But nothing of that sort was involved in this Bill; the Corporation only asked the power to enter into an agreement to purchase. If the firm were confident that there was any goodwill, they would not sell unless they received something for that goodwill. He was willing that the words "if any" should be inserted.

After deliberating in private, the Committee inserted the clause providing that the Corporation should not supply in the Company's area until they had purchased the firm's mains, pipes, and apparatus, and had also purchased the goodwill, "if any," attaching to the supplies of gas given by the Company, or paid compensation for loss, "if any," to the Company through ceasing to give such supply.

OLDHAM CORPORATION BILL.

This Bill was considered by the Local Legislation Committee of the House of Commons last week, and was ordered to be reported for third reading. The gas clauses are of a general nature, and were set out in the "JOURNAL" for Jan. 21 (p. 143). There are no substantial alterations. The Bill has already passed the House of Lords.

MANSFIELD CORPORATION BILL.

This Bill has been ordered to be reported for third reading by the Local Legislation Committee of the House of Commons. The only clause relating to the gas undertaking is that relieving the Corporation from the obligation to supply gas for other than lighting or domestic purposes where the capacity of the mains is insufficient. This is the new clause which has been agreed between the National Gas Council and the railway companies, and was set out in the "JOURNAL" for June 3 (p. 676).

LEGAL INTELLIGENCE.

OUTSIDE THE CONTRACT.

In the King's Bench Division of the High Court of Justice, on July 22, Mr. Justice ACTON heard an action brought by Mr. Frederick Albert Clover, of Church Road, Richmond, against the Tottenham District Light, Heat, and Power Company. Plaintiff claimed £130 for work done in connection with the scaling to bare metal surface of the outer lift of a 180-ft. gasholder at the Willoughby Lane Works, together with the third lift and certain sections of the second lift.

Mr. CARTWRIGHT SHARP, for the plaintiff, said the question for decision was whether the work done was extra to the contract between the parties. His contention was that this was the case. The holder in question consisted of four lifts. In 1920 plaintiff had an interview with Mr. A. E. Broadberry, who was at that time Chief Engineer and General Manager of the Company, when it was arranged that plaintiff should paint and clean certain portions of the holder for £300. While the work was in progress, it was discovered that something more than mere cleaning was required. Certain of the coupling plates needed all the paint scraped off—*i.e.*, scraping to bare metal surface. This was acknowledged to be outside the contract, and £25 extra was paid. The work having been done satisfactorily, Mr. Broadberry suggested that plaintiff should put in a tender for doing the work of cleaning the holders over a period of several years. Plaintiff sent in a tender; and it was agreed to pay him £500 a year. Accordingly he proceeded to do the job; and again it was found that extra work was wanted, and certain plates were required to be scraped to bare metal, in connection with which Mr. Broadberry agreed to pay £50 extra. The work proceeded satisfactorily; but in 1923 there was further extra work found to be necessary, which a foreman of the Company instructed plaintiff to do. Mr. H. C. Smith had in the meantime succeeded Mr. Broadberry, and his attitude was that plaintiff had not received an order for the work, and no extra payment would be made. Plaintiff accepted the position for the time. Then, in May, 1924, plaintiff started the cleaning again, and got everything ready for the final coat of paint, when, on Mr. Smith's instructions, the defendants' foreman painter told plaintiff that, before painting, the whole of the lower lift and some portions of the other lifts had to be scraped to bare metal surface. This work was done, but was clearly outside the contract; and it was in respect of it that plaintiff sought to recover payment. The defence was, said Counsel, that the work was covered by the contract between the parties, whereunder the plaintiff, for a lump sum payment of £500 a year, agreed to do the work on the holders.

Plaintiff gave evidence, and stated he specialized in painting gasholders.

His LORDSHIP, giving judgment, said he had come to the conclusion that the work done was not within the contract; and remuneration was not included in the lump sum of £500 a year. In the circumstances, there must be judgment for the plaintiff for the amount claimed, with costs.

Poulton-le-Fylde Gas Undertaking.—In the Poulton-le-Fylde District Council, on July 23, Mr. Burrows moved the appointment of a Special Committee to investigate the administration of the gas undertaking. The Department had a loss of £795, he said, and this was the profitable undertaking spoken of in 1924. Long before their funds were satisfactory, the gas-works would be "a heap of ruins—derelict gas-works standing at over £13,000 more than they should be." It was a business undertaking when the Council took it over. But, sooner or later, if they continued present methods, they would have to carry the deficit to the rates. Mr. R. P. Tomlinson said they were prepared to go to the ratepayers of the town, believing they had the full endorsement of the people, who had benefited by their policy. The motion was defeated.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN CO-PARTNERSHIP FESTIVAL.

Experience of Thirty-Five Years.

Last Saturday, at the Crystal Palace, the South Metropolitan Gas Company celebrated the completion of 35 years' working of the co-partnership which, founded by Sir George Livesey in 1889, has in the intervening period proved so beneficial both to the undertaking and to the employees. For the celebration, some 9000 tickets were issued to co-partners and their wives, and to children who took part in the sports.

As usual, the afternoon was devoted to a sports programme, carried through in the boating lake and in the Palace grounds. The Organizing Secretary was Mr. A. Coleman; the Hon. Sports Secretary, Mr. A. E. Bickerton; and Mr. J. W. Morfill, Swimming Hon. Secretary. On the sports ground, Mr. F. Day was Referee; and this position on the boating lake was occupied by Mr. J. H. Kimber. With regard to the sports themselves, one feels that hearty congratulations are due to the South Metropolitan Gas Company on the great athletic prowess of so many of those in their service, and to the employees on the magnificent opportunity of displaying this prowess that is offered them by the festival. Subsequently it took the President of the Company (Dr. Charles Carpenter, C.B.E.) a solid half-hour, without a pause, to distribute the handsome prizes which had been won by the various competitors; and here was further proof of fitness forthcoming, for, in spite of the fact that the contests had taken place in blazing sunshine and with the thermometer at dizzy heights, no sign of distress, or even trace of fatigue, remained on any face. As a matter of fact, the winner of the road race from the main gates of the East Greenwich Gas-Works to the Crystal Palace was Mr. M. J. Morgan, who is 46 years of age. The South Metropolitan Gas Company's Military Band played selections during the afternoon, conducted by Mr. Sydney Herbert. The Company's St. John Ambulance Corps, under Captain J. Payne, were in attendance.

Welcome tea was followed by the co-partnership meeting in the centre transept—at which the President was supported by several Directors, and by Mr. Frederick M'Leod (General Manager) and other chief officers—and a delightful display of Swedish drill and special dancing, under the direction of Mr. A. Coleman and Miss N. Webber, and accompanied by the band. This portion of the proceedings was opened by the following

ADDRESS BY DR. CARPENTER.

Ladies and Gentlemen,—It gives me great pleasure to preside this afternoon over this large gathering, and to remind you of the fact that it marks the completion of the first year of our Company's second century of existence. Since we last met in this building, our Centenary Book has been issued, and you have had an opportunity of learning something about the Company's early history and its progress during the past one hundred years. You will, I am sure, agree that the record is one of which we may all feel justly proud. It is, I think, fitting that we should at this time remember those adventurous pioneers who a century ago put up the necessary money and founded a business which to-day provides employment and the means of livelihood for more than 8000 men and their dependants. We are under a deep debt of gratitude to those early capitalists who risked their savings in gas, as many like them did in various other industrial projects, and without whom this country could not have reached the industrial and commercial eminence it has since attained. Both capital and labour were at that time, as to-day, necessary for the development of industry; and all experience clearly demonstrates that friendly co-operation between the two is essential, if the best results are to be secured and the direct interests of the community efficiently and economically served.

THE NOTABLE EXAMPLE OF GAS.

The great expansion of the business of gas supply is one of the most notable examples of progress during the past century, particu-

larly in the latter half of that period. While in general use in business premises, gas for domestic lighting was for many years to be found only in the houses of the well-to-do; but as a result of the enterprise of many progressive undertakings, it has long since become a highly-valued servant to all classes of society. The various purposes for which it is employed, the convenience and comfort secured by means of its use, ensure for gas a place among the necessities of everyday life. In this connection, however, there are certain important points to be observed. The price must be reasonable and the supply reliable and constant in quality; otherwise gas will lose its popularity, sales will diminish, and there will follow loss of employment among those now engaged in its production and distribution. Our Company has always taken an active part in every progressive movement or method calculated to increase the efficiency of its working or to improve the service it is under an obligation to render to the public. It is gratifying to know that the efforts made in this direction have been eminently successful, securing not only the approval and approbation of our customers, but also of the public authorities, both parliamentary and others. The satisfactory position we hold in industry has not been reached in any casual manner or by haphazard methods, but is the result of a definite progressive policy consistently pursued by the management, and loyally and intelligently supported by the employees of all grades—a unity of effort only to be secured where mutual confidence and a spirit of goodwill exists.

EVER MINDFUL OF THE WORKERS.

The Company has never been indifferent to its workers' personal welfare. More than eighty years ago a sick fund was established, followed a few years later by a superannuation fund, both on a mutual contributory basis. These, as you are aware, still function; the rules of the latter having recently been revised so as to provide more substantial pensions. There is, however, one great outstanding event in the Company's history—the founding of our co-partnership in 1889. The object of the scheme was to encourage employees to take an increased interest in their work by giving them a new motive for endeavouring to promote the prosperity of the Company, and to provide an opportunity for them to improve their position in life by saving their annual bonus and becoming holders of the Company's stock. We are to-day celebrating the completion of 35 years' working of the scheme, and it will be interesting to take a brief review of what has been achieved.

A REVIEW OF THE CO-PARTNERSHIP.

First, have co-partner employees taken a keener interest in their work, and used every opportunity of promoting the prosperity of the Company? To this question every co-partner here should be able, with a clear conscience, to answer "Yes"—so far as he is concerned. Personally, I have no hesitation in expressing my conviction that, with, perhaps, some rare exceptions, such answer would be justified. This is certain, without any shadow of doubt—that under co-partnership a mutual confidence has been created which deepens with experience, and a spirit of goodwill strengthening as the years pass. That this is so is shown by the loyal manner in which employees of all ranks co-operated with the management in facing and surmounting the many difficulties that arose during the period of the great war and following its termination, vindicating throughout the fundamental principles of true co-partnership. Let us now for a moment consider the financial advantages of the scheme—a very important side of the question to all concerned, and particularly to the weekly wage-earner whose opportunities of saving are limited. I should perhaps explain that, upon the retirement or death of a co-partner, his stock is transferred to the register of ordinary shareholders, so that the figure I am about to mention refers to stock held by co-partners still at work. Up to the end of last year, nearly one million pounds have been distributed in bonus; and to-day co-partners own an aggregate of between £400,000 and £500,000 of the Company's stock. Furthermore, the co-partnership has assisted nearly 800 men to purchase their own houses; and many of your old colleagues now retired find the half-yearly dividend on their capital a very welcome addition to their pension. I cannot leave this subject without reminding you that our co-partnership, which until 1920 was an entirely voluntary arrangement entered into by the Company, was in that year made statutory by Parliament—the only scheme in this country so established. The security thus provided should inspire every co-partner to increased effort, in order to justify the retention of the exceptional privilege thus granted.

NEED OF INDUSTRIAL PEACE.

You may ask why it is that, with knowledge of our experience and that of many other co-partnership firms, the system is not more extensively adopted. Many, and differing, answers would doubtless be given, varying with the views held by the person questioned. Personally, I believe the chief obstacle is the more or less thinly-veiled hostility of those whose whole attitude appears to be one of inciting and encouraging a feeling of mutual suspicion rather than of confidence between workpeople and employers; and there is very little hope for co-partnership while this spirit prevails. The country sorely needs, and never so urgently, a period of industrial peace; but, in view of what has happened during the last few years, what hope can there be of this? Figures recently issued by the Board of Trade show that over a long period there has been a yearly average of 732 labour disputes, involving over half-a-million workpeople, and resulting in the loss of over twelve million working days. The loss to wage earners must be colossal; and whatever settlement may be arrived at, the strife and ill-feeling is in no way checked, but becomes the more acute. But to return to our own case—and it certainly forms a very pleasing contrast. What has been the chief factor in making our co-partnership such a pronounced success? It is that from the outset there has been a full recognition of the obligation to work faithfully and honestly, as well as to avoid all waste, whether of time or material, followed by a loyal and constant observance of such obligation. The veterans who, by their fidelity to co-partnership principles, have so assisted in firmly establishing our scheme, are fast disappearing. There are comparatively few with us now who were at its formation; and their number becomes less year by year.

A MESSAGE TO THE YOUNG MEN.

What of the future? This is a question to be answered by the younger men in our service—not in words, but by acts. In order to maintain the success of our co-partnership, and to safeguard the benefits it confers, it is essential that the steadfast loyalty and willing co-operation which have hitherto existed shall continue unabated. Indeed, the circumstances of to-day, and still more of the near future, call for even greater effort on the part of co-partners of all ranks. To the young men who form such a large proportion of our entire staff I wish in a friendly spirit to say this: You are working under conditions infinitely more favourable than your fathers enjoyed, or, indeed, are to-day to be found generally operating elsewhere. This advantage you owe to our co-partnership, and to your colleagues, past and present, in the Company's service to whom I have previously referred. You will, naturally, desire that these conditions shall continue, and, if possible, be improved. I heartily commend such a desire, but must remind you that there is only one way in which you can expect to ensure its attainment, and that is by a constant, intelligent, and zealous performance of duty, whatever may be the job on which you are engaged—in short, by fair and square dealing between the Company and yourselves. Running our business is no "picnic," but is a task calling for unremitting attention on the part of the officials, who need the support by faithful service of all subordinates—every man, whatever his station, carrying his share of the burden. The slacker of any grade is a menace and a danger, a mere sponger on his industrious colleagues; and there is no place for him in co-partnership. I believe, but most regretfully, that to-day there are many men to whom pleasure or pride, or even interest, in their work is an unknown sensation. This may be but a passing phase, due in a measure to the aftermath of war, and may in course of time disappear. I sincerely hope this is so. Of one thing I am perfectly certain, that there is nothing in this world better calculated to keep a man mentally and physically fit than hard work, suited to his capacity; and I have invariably found the busiest man to be the happiest and healthiest. Co-partnership being, as it were, a kind of legacy, achieved, if I may say so, by the efforts of others rather than by yourselves, there is, perhaps, a tendency to under-estimate its value. Such an attitude on your part would seriously endanger its future. It is, indeed, a heritage which many thousands of workers outside our service would most gladly share. To preserve and extend the benefits associated therewith is a responsibility you accept by your membership, and you are in honour bound so to act that future co-partners shall have ample reason to be grateful, even as you to-day owe a debt of gratitude to your predecessors. It is the privilege and duty of us all to work for the Company's prosperity. To achieve our object, a cheap and efficient service to the public is indispensable; and to this end a spirit of goodwill and loyal co-operation in work is essential. If the example furnished by our experiences of the past 35 years be allowed to inspire us to equal endurance, and like devotion to duty, I have no fear for the future, but look forward with every confidence to a maintenance of the high and honourable position so long held by the Company in the field of industry.

On the proposition of Mr. Ernest Hughes (Chairman of the Employees' Section of the Co-Partnership Committee) three hearty cheers were given for the President and Directors of the Company, as a mark of the gratitude of all present for what was a wholly enjoyable festival.

The evening concluded with dancing to the music of the South Metropolitan Gas Company's Co-Partnership Orchestra.

ALDERSHOT CO-PARTNERSHIP FESTIVAL.

The Annual Co-Partnership and Hospital and Benevolent Fund Festival of the Aldershot Gas, Water, and District Lighting Company took place last Saturday, when Mr. R. W. Edwards (the Chairman and Managing Director of the Company) presented the report and accounts for the twelve months ended June 30.

In doing so, Mr. Edwards said he thought the financial results might be regarded as eminently satisfactory. That the Company's welfare schemes were beneficial was indisputable, and was borne out by the excellent relations which had always existed between the Company and their employees. To separate co-partnership from the hospital and benevolent fund would be like taking the soul out of the body. Co-partnership was a magnificent body, active physically; but the soul was supplied through the channels of the hospital and benevolent fund, whose work was unostentatious but most thorough. The co-operation of these two branches and the Recreation and Sports Club tended to enable a man to work in harness, with his mind acting as a human mind ought. The Committee controlling these schemes were carrying on a noble work; and the Directors deeply appreciated their efforts.

He urged that the principle of co-partnership could be applied to the coal-mining industry, if there could be devised a basic rate of wage calculated on the economic wealth or trade value of each area, and in sympathy with the cost of living, as compared with the figure which existed at the time the basic rate was created. Such basic rate should, however, be increased by a participation in any surplus profits of each colliery, after paying prior capital charges and the ordinary capital wages, which no one could dispute as being reasonable, of about 5 p.ct. dividend on ordinary stock. The simplicity of such a plan would, to his mind, bring about economy in production and strengthen the bonds of friendship between capital and labour.

The Deputy-Chairman of the Company seconded the resolution.

On the suggestion of Mr. J. H. Clegg, Burnley Corporation Gas Engineer, the police force have been equipped with the latest apparatus for dealing with cases of coal gas poisoning.

BRADFORD CORPORATION GAS REPORT.

Reporting to the Gas Committee of the Bradford Corporation on the working of the Department for the year ended March 31, Mr. Charles Wood, F.C.S. (the Engineer and Manager), says the financial statement prepared by the City Treasurer shows that the gross income for the year amounted to £542,075, and the expenditure to £453,382, leaving a gross profit of £88,693. From this the following charges had to be met: Interest on loans, &c., £42,288; contribution to sinking fund, £18,511; and income-tax, £14,921—leaving a profit on the year's working of £12,973.

In comparison with the figures for the preceding year, the gross income is reduced by £27,027, and the gross expenditure by £4153. The net profit is £12,973, as against £38,427 a year ago. When compared with the year 1914, the gross income shows an increase of 65 p.ct., and the gross expenditure 67 p.ct. By the transfer of the net profit, and after providing for an appropriation of £13,000 for the relief of rates, the net revenue appropriation account at the end of the year had a credit balance of £42,644. The total expenditure on capital account has been increased to £1,320,939; and of this amount £576,534 remains outstanding.

The amount received for gas was £343,782, or £18,425 less than in the previous year. The revenue per 1000 c.ft. sold shows a decline from 3s. 7·758d. to 3s. 5·347d.; this being entirely attributable to the reduction of 3d. per 1000 c.ft. brought into operation from July 1, 1924, and the extended operation of the scale of special rates for industrial use of gas. The sales for the year show an increase of 8,894,000 c.ft., or 0·45 p.ct.; the yearly total being 1,995,498,000 c.ft., as compared with 1,986,604,000 c.ft. in 1924. The increased demands during the earlier months of the year pointed to a larger increase over the whole period; but considering the state of trade in the city, and the abnormally mild weather experienced during the winter, the figures quoted should be regarded as satisfactory. The make per ton of coal carbonized shows a slight increase at 13,390 c.ft.; and the standard of quality has been maintained.

The markets for residuals, with the exception of coke, have again been most unsatisfactory; and the total receipts under this head are £131,186, or £8091 less than a year ago. Since the close of the financial year, the downward movement in the residuals markets has continued; and so far the prospects for the current year cannot be regarded as satisfactory.

The expenditure on coal has increased by £5942; the total cost of the quantity carbonized (including carriage and handling charges) being £197,907, or an average of 24s. 6·95d. per ton, against £191,965, or an average of 23s. 9·07d., for the previous year. During the twelve months stocks were increased by 32,307 tons. As in previous years, the policy of purchasing coal over short periods has been to the benefit of the Department. Supplies have so far been plentiful; but in view of the state of uncertainty at present overshadowing the mining industry, Mr. Wood cannot forecast the position for the remaining portion of the year, though, with the Department's ample stocks, there need be no cause for alarm. The net cost of coal after deducting receipts from residuals comes out at £66,722, or £14,035 more than a year ago; the receipts from coke giving 48 p.ct. and liquid products 18 p.ct. of the cost of coal.

The sales of appliances through the Darley Street showrooms have again been satisfactory. A recently prepared return shows there are in use throughout the area approximately 9500 gas cookers, 6000 gas fires, and 15,000 other appliances, including radiators, geysers, boilers, &c. The value of the showrooms is reflected in the increased use of gas for heating, cooking, and industrial purposes. Consumers are availing themselves more fully of the facilities provided for them to become acquainted with the appliances best adapted to their particular requirements, and to acquire the most economical methods of using them.

Mr. Wood considers that the results obtained during the year are satisfactory, having regard to the trying times. The outlook for the present year is not a bright one; but it is a matter for thankfulness that there is every prospect of a continuance of the existing harmonious relations between gas undertakings and their workmen.

RECORD PROFIT AT OSSETT.

Mr. Broadhead, moving the adoption of the minutes of the Gas Committee by the Ossett Town Council, stated that the net profit for the past financial year amounted to £2611. This was the largest profit they had ever made; and they were selling gas at 1s. per 1000 c.ft. less than several of their neighbours were doing. As compared with the preceding year, 2,977,000 c.ft. more gas had been made, and 6,098,700 c.ft. more had been sold. This was a big move in the right direction, for it had brought down the unaccounted-for gas by over 3,000,000 c.ft. Most of this saving he attributed to the work that had been done in the meter department; many meters that were registering slow having been repaired. This work had got behindhand during the war and the years that had followed it. In concluding his statement, Mr. Broadhead said he desired to thank the Manager (Mr. A. E. Mottram), the staff, and the workmen, for the able manner in which they had carried out their duties during the past year; and also the consumers, for "sticking to the ship" through the difficult times of the last two or three years.

Alderman Marsh congratulated the Chairman on his report, and remarked that the Gas Department had been worked on economical lines. The manufacturing expenses had decreased from 1s. 7·76d. in 1924 to 1s. 5·62d. per 1000 c.ft. of gas sold; while distribution expenses also showed a reduction from 6·12d. to 6·06d., and management expenses from 4·22d. to 3·93d. Considering the bad state of trade and grave depression in all businesses, he thought it was a very satisfactory balance-sheet, and that they could congratulate themselves on the result. He also paid the highest tribute to Mr. Mottram for having put the gas-works on the high road to complete recovery, and partly wiping out the adverse balance of the previous year.

STOKE-ON-TRENT GAS DEPARTMENT.

Annual Report of the Engineer.

In presenting his report on the working of the City of Stoke-on-Trent Gas Department for the year ended March 31, Mr. A. Mackay (the Chief Engineer and General Manager) says that, though the actual business transacted by the undertaking during the past financial year was exceptionally successful, the fact of the cost of raw material being so high, and the price of residuals—more particularly tar and sulphate of ammonia—falling very considerably during the year, has caused a small deficit, approaching £3000. But having regard to the adverse circumstances referred to, he thinks the Committee may congratulate themselves that they have been able to finish the year so well.

In the revenue account, the total expenditure was £250,100, against £242,666 for the previous year, showing an increase of £7434; while the revenue was £301,216, against £312,601, being £11,385 less. The price of gas having been reduced at the beginning of the year by a sum equal to 3d. per 1000 c.ft., it was to be expected that the revenue from consumers would be reduced; but over and above the reduction in receipts from consumers of gas, there was a reduction on tar receipts of practically £9000. A further reduction in revenue was caused by the elimination of ordinary meter rents, which were in existence under the British Gas Light Company's management; and in this year's accounts there is shown a benefit to the consumers in these areas of £2500. He is sure the gas consumers in the Hanley and Tunstall areas will appreciate the very considerable benefit they have received by the elimination of these meter rents, which is approximately equal to 3d. per 1000 c.ft. of gas to them.

In dealing with the accounts under the trying market conditions ruling during the year, it is interesting to note that the increase in cost of coal and wages for 1925, as compared with 1914, is over 100 p.ct.; while the price of gas to-day is only increased by 61·70 p.ct. as compared with the average price ruling in 1914. It will therefore be recognized that the Department is being worked on most economical lines; and when the market for residuals slumps, as it has during the year, it reacts on the financial position all the more—especially when working with so little margin.

Though Stoke has been successful during the year under review in more than maintaining its position so far as the revenue from coke is concerned, the coke market to-day shows anything but a bright outlook. As to the immediate future of sulphate of ammonia, it cannot be urged that the prospects of much better average prices are hopeful. Against this, however, it must be said that prices would to-day probably have been chaotic, but for the unifying policy and the enterprise generally shown by the Sulphate of Ammonia Federation. The course of events with regard to tar has been disappointing. Values of tar to-day are about one-half what they were twelve months ago; and at the present moment it is very difficult to anticipate what may take place in connection with this market during the current year.

CENTRALIZATION.

Proceeding, Mr. Mackay remarks that the outstanding feature of the year has been the successful completion of the first section of the work of centralization of manufacture, culminating in the total cessation of gas making at the Stoke and Fenton Works in September, and the subsequent supply of these areas with gas in bulk from Etruria. As was anticipated, this portion of the work of the centralization scheme was carried through within twelve months of its inception. It involved the complete remodelling of the carbonizing plant, duplicating of the carburetted water gas plant, the erection of new condensers and exhausting and scrubbing plant, together with the necessary compressors for boosting the gas to these works, and also the provision of a steel-welded high-pressure main between Etruria and the Stoke and Fenton Works. Since the closing-down of these two works, the necessary high-pressure steel main for giving a supply of gas from Etruria to Longton has been completed; this portion of the work being carried out under an unemployment grant. Sanction is now awaited for laying the high-pressure main through Wolstanton to the Longport Works, when the whole area will be in connection with the Etruria Works. The erection of the chemical works, which is also being financed under an unemployment loan, is at the present moment proceeding; and it is anticipated that this plant will be ready for working in the summer of 1926. Application has been made for a loan with a view to undertaking the second portion of the centralization scheme; and it will be necessary that this second portion of the plant be erected before a supply of gas can be given to the Longton and Burslem areas from the central works.

It is gratifying to Mr. Mackay to be able to again report an improvement in so far as the unaccounted-for gas is concerned. In 1917, when he took over the management of the undertaking, the unaccounted-for gas in the Stoke area was 18 p.ct.; while during the year under review the figure has been reduced to 7½ p.ct. The percentage of unaccounted-for gas all over the city is now reduced to 10·71 p.ct., showing a further reduction on the previous year's figure—which is a satisfactory one, having regard to the area being a mining one.

Tottenham Light, &c., Company's Dividend.—Dividends in respect of the half-year ended June 30 have been declared by the Tottenham District Light, Heat, and Power Company at the following rates per annum (less income-tax), payable on Aug. 11: 5 p.ct. preference stock, 5 p.ct.; 5½ p.ct. preference stock, 5½ p.ct.; "A" stock, 7⅛ p.ct.; and "B" stock, 5⅞ p.ct.

GAS REGULATION ACT APPLICATIONS.

The following notice has appeared in the "London Gazette" regarding an application to the Board of Trade under the Act.

SPECIAL ORDERS.

Dunstable Gas and Water Company.

To enable the Company to raise additional capital, to make further provisions with regard to profit-sharing schemes, and for other purposes.

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration a copy of the following Order made by the Board of Trade under section 1.

Ormskirk and District Gas and Electricity Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 16d. per therm.

Prepayment meter clauses are included. (July 23.)

WHAT FALKIRK IS DOING FOR SMOKE ABATEMENT.

A party of delegates attending the Royal Sanitary Institute Congress in Edinburgh spent an interesting afternoon as the guests of Messrs. R. & A. Main, Ltd., gas appliance makers, at their Falkirk Works. The company of ladies and gentlemen, who included Sir George Newman (Chief Medical Officer of the Ministry of Health) and Councillor Ritchie, of Edinburgh, travelled by motor coach from the Capital. A tour of the works was made in small groups, to whom the different processes involved in the manufacture of gas fires, cookers, &c., were explained. Keen interest was shown by the delegates in the great development of gas appliances in recent years.

At the conclusion of the visit tea was served, at which speakers of the party expressed their views that the increasing use of gas appliances, in addition to making easier the task of the housewife, was steadily helping to realize the aims embraced in the term "smoke abatement," and bringing us towards a cleaner and brighter atmosphere in our towns and cities.

ACCRINGTON GAS-WORKS FINANCES.

At a meeting of the Accrington and District Gas Board last week the expenditure on revenue account during the year was stated to have been £92,172, and the income £125,328—leaving a gross profit of £33,156, equal to £8 8s. 11d. p.ct. on the net indebtedness of the undertaking. The principal items showing increased expenditure were coal, repairs and maintenance, distribution, consumers' maintenance scheme, and the gas exhibition. The income showed a decrease of £401 as compared with the previous year; the principal decreases being coke £323 and tar £4558. Gas sales increased by £3297, ammonia products by £1026, and showroom by £126. After meeting interest and sinking fund payments of £28,518, and setting aside £1626 for new plant, the net result was a deficit of £1348. The deficit on gas net revenue account stands at £9313. The average price for gas was 3s. 9·5d. per 1000 c.ft. (against 3s. 11·5d. for the previous year). The average rate charged is 40 p.ct. above pre-war; while wages and materials average 100 p.ct. above. The income from residual products totalled £30,568, or £3818 less than in the previous year. Briefly, the gas-profits are £4169 less, which is about equal to the amount granted in reductions. The quantity of gas produced was 556,534,000 c.ft., an increase of 26,580,000 c.ft. The total cash value of showroom sales during the year was £7812, clearly indicating a more extended use of gas for domestic purposes.

Alderman Dewhurst (the Chairman), commenting on the report, said the year had been a busy one, marked by satisfactory progress.

Burntisland Gas Price Increase.—The price of gas at Burntisland is to be increased 5d. per 1000 c.ft.

The Multar Syndicate, Ltd., has been formed, as a private company, to acquire and turn to account a patent for the emulsification of bitumen and coal tar. The nominal capital is £6000.

Brighton Gas Company's Centenary.—A full account of the Brighton and Hove General Gas Company's centenary celebrations is contained in the July issue of the Company's "Co-Partnership Magazine." One celebration took the form of an outing to the Crystal Palace, to which the Chairman (Mr. A. M. Paddon) and Directors invited the whole of the employees, together with their wives and children. Three parties on different dates were arranged for, averaging about 800 each day, or nearly 2400 in all. Excellent arrangements were made by Messrs. C. H. Rutter, H. V. Corfield, and P. E. Browne (Chief Organizer). In connection with the centenary, a luncheon was given by the Chairman and Directors at the Grand Hotel. The Magazine also contains an article, over the initials "C. H. R.," which gives many interesting details regarding the inauguration and progress of the gas supply of Brighton and Hove. The first Company—the Brighton Gas Light and Coke Company—formed with the Prince Regent as patron, started to produce gas about the year 1818; and in 1825 the Brighton and Hove General Gas Company came into being, and established works next door to the old Parish Church at Hove. The latter became in subsequent years the dominant Company; but an Act of 1881 authorized the amalgamation of the two undertakings.

Continental Union Gas Company's Dividend.—The Directors announce that it is proposed to pay, on Oct. 5 next, a final dividend of 3½ p.ct. on the preference stock—making 7 p.ct. for the year—and a dividend of 2 p.ct. on the ordinary stock, both less income-tax at 4s. 4½d. in the pound, for the year ended June 30, 1925.

Hebden Bridge and Mytholmroyd Gas Board.—The annual report of the Hebden Bridge and Mytholmroyd Gas Board shows the gross profits for the past year to be £5729. The net profit amounts to £302, against £1309 a year ago. The amount of stock issued and capital borrowed totals £115,995; and the capital expenditure stands at £124,686. During the year the gas manufactured (including 9,492,000 c.ft. of water gas) was 117,319,000 c.ft., an increase of 2,748,000 c.ft. The coal carbonized yielded 14,416 c.ft. per ton, against 14,370 c.ft. in the previous year. The gas unaccounted for was 6·65 p.ct., against 7·05 p.ct.

Macclesfield Gas Undertaking.—It appears from the report of the Engineer and Manager (Mr. H. Curtis) that the output from the Borough of Macclesfield Gas-Works during the year ended March 31 was 1,289,576 therms (including 35,624 therms of water gas); the quantity consumed being 72,180 therms, or 6·54 p.ct., more than in the preceding year. The prepayment system now accounts for 42 p.ct. of the total consumption. The unaccounted-for gas figures at 7·6 p.ct. The make of gas per ton of coal carbonized was 81·01 therms. The accounts show a gross profit for the year of £5260, and a net profit of £79.

Newport (I. of W.) Rotarians.—Mr. F. E. Cox, the Engineer and Manager of the Newport (Isle of Wight) Gas Company, delivered an address on the "Manufacture of Coal Gas" at the fortnightly luncheon of the Newport Rotary Club, on Wednesday last. The Rotarians subsequently visited the Newport Gas-Works, where they were received by the Chairman (Mr. Robert Pinnock, J.P.) and the Deputy-Chairman (Mr. A. W. Oke, B.A.), and after an inspection of the works were entertained at tea in the Board Room. Mr. T. Ross Pratt (President of the Club) extended hearty thanks to the Company for their hospitality.

"C.G.A. Service Messenger."—The first issue is to hand of a publication bearing this title, which is intended to be a quarterly message from the head office of the Colonial Gas Association, Ltd., in Melbourne, to the works managers and staff, in the interests of good public service. It is an innovation calculated to co-ordinate more completely the activities of the various works of the Association with the head office. Among other matter, there is noted, as showing the growth of the Association's business, that a new holder is approaching completion at Footscray; while others are to be erected at the Oakleigh and the Horsham Works.

Smethwick Councillor's Coke Contracts.—Any aspersions made against Mr. S. W. B. Stephen (the Chairman of the Smethwick Gas Committee), concerning his associations with the Committee, which resulted in his resignation from the Town Council, are now completely dispelled by the official report of Mr. T. Hollis Walker, who conducted an inquiry into the circumstances connected with contracts for coke entered into by Messrs S. W. B. Stephen & Co. and E. O. Whitehouse with the Corporation [see *ante*, p. 179]. Mr. Hollis Walker states that he is satisfied Mr. Stephen desired that the manner in which these contracts arose should first be mentioned to the Gas Committee, and that none of the members dissented. "I find," he adds, "that there is nothing in the case to cast the slightest aspersion upon his honour and integrity."

Safety in Mines Research.—The third annual report of the Safety in Mines Research Board, in respect of the year 1924, has just been published by H.M. Stationery Office, at the price of 1s. net. A list of the programmes of research, numbering a hundred, is given in an appendix. The programmes are divided into ten groups, dealing with coal-dust explosions, fire-damp explosions, spontaneous combustion of coal, flame-proof mining electrical machinery, electrical researches, mining explosives, electrical shot-firing apparatus, support of underground workings, mining appliances (miscellaneous inventions, devices for trapping dust generated by drills, safety lamps, and wire ropes), and mine temperatures. The report contains a brief account of the work done on those programmes, numbering over sixty, which have been selected as the most urgent.

Extra Remuneration for Work Done.—The Congleton Town Council last week further considered an application from the Gas Manager for the payment to him of 1½ p.ct. (£276 10s.) for work done in connection with the preparation of the plans, design, &c., for the new vertical retorts at the gas-works. Alderman Taylor was of opinion that the Council, through the Gas Committee, were under a moral obligation to grant the Manager some extra remuneration for carrying out this work. Mr. Cadman said he had attended practically all the meetings of the Committee, and had never heard anything mentioned with regard to granting this extra remuneration. He thought it opened-up a very serious question, and would be a precedent in reference to what might be done by other officials. He moved they do not accede to the application. Alderman Solly suggested that they should grant a lump sum of £150 to the Manager; and this was agreed to.

Eastbourne Gas Company's War Memorial.—On Thursday, the 16th inst., the Memorial erected by the Eastbourne Gas Company at the works, Roselands, in honour of those of their employees (fifteen in number) who made the supreme sacrifice and of others who served in the great war, was unveiled by the Chairman of Directors (Mr. Caleb Diplock), who was supported by other Directors, and by Mr. J. S. Garrard (the Secretary), and Mr. W. H. Hammond (the Resident Manager and Engineer). The tablet has been affixed to the offices, in view of all who approach from the open road, and the little garden in front of it has been turned into a pretty rockery, to give a fitting setting, the care of which will be a sacred trust to those concerned. The tablet is of silver-grey Cornish granite, embellished in bronze. A shield in the centre has an Italian outline with laurel wreaths, and on it the Gas Company's crest. It was designed and executed by Mr. C. Godfrey Garrard, son of the Secretary.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Business has once again come more or less to a standstill. Practically all coal available for definite delivery this month has been arranged for, and negotiations have been largely confined during the past week to the arrangement of loading turns.

Naturally there has been no disposition to trade beyond the end of the present month, until the situation is clearer. Feelings with regard to a possible stoppage have been alternately pessimistic and hopeful, but those in the trade still confess to the greatest difficulty in imagining how any satisfactory solution can be found of the present problem.

Any remaining lots for prompt sale have been eagerly bought at good prices, mainly for home account. Durham unscreened steams have been in greatest demand, and 25s. f.o.b. is said to have been done for best sorts. A cargo of best gas is said to have been done at 22s. 6d., but in any case prices have been merely nominal.

There is no indication of any improvement even if a settlement is arrived at. On the contrary, the stocking of the past two or three weeks will probably have the reverse effect.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

During the past few days many consumers have come into the market for "spot" lots of fuel, with the result that prices have stiffened to some extent, while deliveries of the better-class coals are difficult to obtain. House coals have not advanced by any considerable amount, though supplies are more difficult to secure.

The majority of the gas concerns appear to have good stocks, although a flow of inquiries for prompt dispatch has been on the market during the last few days.

The export situation is abnormal, with such qualities as hards in increased demand, although it is reported that the actual importers abroad are not paying anything like the figures obtained on this side during the past week or two.

The general situation appears to be that active measures will have to be taken on Wednesday, or immediately afterwards, if a stoppage of the pits is to be avoided.

The prices at Hull at the week-end were (f.o.b.) Yorkshire hards 27s. 6d. per ton. Humber bunker export prices (f.o.b.) usual shipping ports are as follows: South Yorkshire—Hards, Association, 27s. to 27s. 6d. per ton, screened gas coal 25s., washed doubles 21s. to 21s. 6d., washed singles 20s., washed smalls 17s. 6d. to 18s., and rough slack 15s. 6d. to 16s. 6d. West Yorkshire—Hartleys 20s. 6d. to 21s., washed trebles 21s., and unwashed doubles 16s. to 18s. Derbyshire and Nottinghamshire—Top hards 26s. to 26s. 6d., rough slack 15s. to 16s. 6d. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal 22s. 6d. to 23s. 6d., gas coke 21s., and furnace coke 20s. to 20s. 6d.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Though the collieries are working at full pressure, they are not able to keep pace with the demand for special descriptions of coal. There has been a pretty general hardening of values. Some classes of steam coal are subject to a further advance of 2s. Generally speaking, double screened nuts have appreciated latterly at the rate of about 1s. per week. Stringency has increased in the slack market, but terms depend very much on local circumstances. The domestic consumer is taking the crisis more seriously than the industrial buyer. Nevertheless the latter part of the month has seen a well-marked stimulation in the demand from manufacturers. They are now making efforts to strengthen their stocks, particularly the brick-makers and the light metal working traders. The heavy industries are so torpid that the possibility of fuel supplies failing is regarded almost with indifference. Albeit producers of iron and steel have come on the market with the end of the month in view, but very cautiously, as there are no indications of any broadening of consumptive demand for their output, and if operations were compulsorily suspended, they could not be much worse off.

TRADE NOTES.

Messrs. Vickers, Ltd.

Messrs. Vickers, Ltd., have now acquired the whole interest in the Vickers-Spearing Boiler Company. Mr. A. H. Spearing has resigned his position as Managing-Director, and is no longer connected with the Company, which will be carried on as before under the name of the Vickers-Spearing Boiler Company, Ltd. This change also gives Messrs. Vickers, Ltd., the control of Messrs. Tinkers, Ltd., of the Daisyfield Boiler Works, Hyde, near Manchester.

Lectures at Newport (Mon.).—During the Industrial Trades Exhibition, at Newport, from July 14 to 24, lectures on gas cooking were given. These were arranged for the Company by Messrs. Fletcher, Russell, & Co., Ltd., the Richmond Gas Stove and Meter Company, Ltd., Messrs. Wilsons & Mathiesons, Ltd., and Messrs. John Wright & Co. The exhibition was held in the Stow Hill Pavilion, and was very interesting and successful. A representative exhibit of high-grade apparatus was sent by the firms named—including cookers, gas-grates, water boilers, gas radiators, &c. The exhibition should certainly be of considerable help to business in the district.

CONTRACTS OPEN.

Coal.

Tenders are invited by the Wigan Corporation for the supply of coal for the Gas Department. [See advert. on p. 297.]

Tenders are invited by the Worksop Gas Company for 5000 tons of best screened gas coal or nuts. [See advert. on p. 297.]

Gas Coal and Nuts.

Tenders are invited by the Wallasey Corporation for the supply of 60,000 tons of gas coal and nuts. [See advert. on p. 296.]

Spent Oxide Acid.

The Wallasey Corporation invite tenders for 700 tons of spent oxide acid for the manufacture of sulphate of ammonia. [See advert. on p. 296.]

Retort House, &c.

Tenders are invited by the Gas Committee of the Holme Cultram Urban District Council for the erection of new retort house complete, &c. [See advert. on p. 297.]

EXTENSIONS.

Distribution Plant at Middlesbrough.

The Middlesbrough Corporation Gas Committee have approved plans for an extension of the existing governor house at the Marsh holder site, to contain boosting plant for transferring gas to a new holder site in Cannon Street. The estimated cost is £800. A plan has also been passed by the Committee for a governor house on the holder site in Cannon Street, at a cost of £1000. Provision is made for a second governor when this is needed.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 27, 1925.

The crisis in the coal trade is creating a little uncertainty as to the market for tar products, and prices have taken on a somewhat better tone.

There is rather more inquiry for pitch, and the price is firm at about 42s. 6d. per ton in bulk at makers' works.

From all reports, makers continue to be fully occupied with deliveries of road tar, which will undoubtedly create a record this season.

Creosote is steady at about 6¾d. to 6⅞d. net per gallon, and there are a few more inquiries coming forward.

Supplies are insufficient to meet the strong demand for motor benzole and benzole mixtures, and prices of all tar spirits are firm. Pure benzole and pure toluole are about 2s. per gallon. Solvent naphtha 95/160 is 1s. 9d. per gallon.

Pyridine is also in demand, and the price is steady at about 19s. 6d. to 20s. per gallon.

Tar Products in the Provinces.

July 27.

There is little alteration in the markets for tar products, and not much business has been transacted during the past few weeks.

As regards pitch, buyers appear to be willing to run the risk of advance in prices, and are only purchasing, if they can do so, in the neighbourhood of 37s. to 38s. f.o.b. United Kingdom. These prices makers on this side are refusing to consider. In the first place, there do not appear to be large stocks of pitch in existence, and, in the second place, makers realize that their supplies of coke oven tar are already affected, and look like being affected still more in the event of a coal strike.

Creosote is steady, and current make has been moving off at rather better prices than have ruled lately; but as regards export oil the figure is unchanged.

Benzole is still greatly sought after for motor spirit purposes. An improvement in the demand for solvent naphtha continues, and buyers are continuing to cover their requirements to the end of the year.

Naphthalene and anthracene are still neglected; while the prices ruling for crystals carbolic and cresylic acid are such as make sales of crude carbolic or crude cresylic difficult to negotiate.

The average values for gas-works products during last week were: Gas-works coal-tar, 25s. 6d. to 30s. 6d. Pitch, East Coast, 38s. to 39s. f.o.b. West Coast—Manchester, 33s. to 34s.; Liverpool, 34s. to 35s.; Clyde, 37s. to 38s. Benzole, 90 p.ct., North, 1s. 7¼d. to 1s. 8¼d.; crude, 65 p.ct., at 120° C., 1s. to 1s. 1d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 7¼d. to 1s. 8¼d. Toluole, naked, North, 1s. 6¼d. to 1s. 7¼d., nominal. Coal-tar crude naphtha, in bulk, North, 7¼d. to 8¼d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, North, 1s. to 1s. 2d. Creosote, in bulk, North, liquid, 5¾d. to 6d.; salty, 5¾d. to 5⅞d.; Scotland, 5¼d. to 5⅜d. Heavy oils, in bulk, North, 6¼d. to 7d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality unsaleable.

Cookery Lectures at Chesterfield.—Following on the official opening of the new showrooms at Chesterfield, a series of interesting cookery lectures was arranged to be given by Mrs. Dora Rea from July 23 to 31. The lectures are taking place in the Gas Service Department, Knifesmith Gate, Chesterfield, and are proving very attractive. The cooking of a varied range of enticing and seasonable dishes forms part of the daily syllabus, and much interest is being created in gas cooking in the district thereby. The lecture arrangements were made for the department by Messrs. Arden Hill & Co., Ltd., the Davis Gas Stove Company, Ltd., Messrs. Fletcher, Russell, & Co., Ltd., the Richmond Gas Stove and Meter Company, Ltd., Messrs. Wilsons & Mathiesons, Ltd., and Messrs. John Wright & Co.

STOCK MARKET REPORT.

THE settlement on Thursday, which it is reported was one of the heaviest since the rubber boom of 1910, passed off satisfactorily, and business continued on an active scale up to the following day, when a complete change took place. The announcement of the miners' decision to stop work when the owners' notice expires was followed by a general marking-down of prices. Jobbers found they had an almost impossible task to defend themselves against the "bears," and the improvements which had been gradually appearing in gilt-edged stocks disappeared in an hour or two. The unexpected publication of the South African loan on practically the same terms as the Australian loan did not tend to improve matters; and the latter, which opened at ¾ premium, dropped speedily to ⅛ premium.

Home Rail quotations fell materially; but there did not appear to be any large volume of selling. The increase in the traffic receipts for the previous week (a very welcome change) created a good impression. The popular shares such as Courtaulds, Imperial Tobacco, Bradford Dyers, and Swedish Match continued in demand, though they also suffered by the general depression.

In the Gas Market there were a number of dividend announcements for the past half-year, the majority of which show a decrease on the rates paid for the corresponding half-year. There were no increased distributions; but Brentford, European, Gas Light and Coke, and South Suburban are dividing the same rate as a year ago. The Commercial dividends have dropped by 13s. 4d. and 16s. 8d. p.ct. per annum on the respective stocks, Tottenham 12s. 6d. on each stock, and Wandsworth by 15s. on all stocks except the "C" and New, the dividends on which will be 10s. 6d. per cent less. It will be noticed by the Table that, other than *ex* div. quotations, there was only one stock marked down—viz., British ordinary, a fall of 1 to 104-109.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 65, Bombay 19s., British 105¼, Cape Town 7, Commercial 4 p.ct. 83, 3½ p.ct. 84, Continental Union 35, 35½, 36, Gas Light and Coke 83⅜, 83⅞, 84⅜, 84½, 3½ p.ct. maximum 61½, Imperial Continental 138, 140, Maidstone 3 p.ct. debenture 57¼, 57⅜, Montevideo 67½, Oriental 103, 104¾, Primitiva 8s. 3d., 8s. 4½d., 8s. 6d., 4 p.ct. (River Plate) debenture 64, San Paulo 6 p.ct. preference 8, 8⅛, South Metropolitan 92½, 3 p.ct. debenture 58¼ *ex* div., Swansea 6½ p.ct. debenture 101, 101½. Supplementary prices, Southend-on-Sea 5 p.ct. new 86½, 87, 5 p.ct. new "B" 83½, 84.

On Tuesday, Brentford "A" 96 *ex* div., "B" 94 *ex* div., Cape Town 7, 7⅛, 7⅛, 4½ p.ct. preference 5 3/16, 6 1/32, Commercial 4 p.ct. 82½, 3½ p.ct. 82½, 3 p.ct. debenture 56½, Continental Union 35⅜, 36, 36½, Gas Light and Coke 83⅜, 84, 84½, 3½ p.ct. maximum 61¼, 4 p.ct. preference 77½, Imperial Continental 139, 140, Oriental 103½, Primitiva 8s. 9d., South Metropolitan 92½. Supplementary prices, Romford 7 p.ct. "B" 8⅜, 8 11/16, Wolverhampton 8 p.ct. debenture 106, 106½.

On Wednesday, British 105, 105½, Commercial 3½ p.ct. 82¼, 3 p.ct. debenture 56½, Continental Union 37, Gas Light and Coke 83⅜, 84, Imperial Continental 139, Primitiva 8s. 3d., South Metropolitan 92¼, 92½, 3 p.ct. debenture 58½ *ex* div., Tottenham "B" 93. Supplementary prices, Barnet "A" 144½, Leatherhead 5 p.ct. 10.

On Thursday, Cape Town 4½ p.ct. preference 5⅝, 6, Continental Union 38, European 7, 7 3/16, *ex* div., Gas Light and Coke 83⅛, 83¾, 84, 84½, Imperial Continental 139, 140, 140⅜, 141, Oriental 104½, Primitiva 8s. 6d., 8s. 9d., South Metropolitan 6½ p.ct. debenture 103, Tottenham "B" 94, 95 *ex* div.

On Friday, Alliance and Dublin 63, Cape Town 7, 4½ p.ct. preference 5⅞, 6, Continental Union 38, Gas Light and Coke 83½, 83⅞, 3½ p.ct. maximum 61⅛, 61½, Imperial Continental 140 1/16, 141, 141¼, Primitiva 8s. 3d., 8s. 6d., 9s. Supplementary prices, Cape Town 5 p.ct. mortgage debentures.

In Lombard Street discount rates showed a hardening tendency during the week. For three months' bills 4¼ p.ct. was easily obtainable. The new Treasury Bills averaged £4 3s. 6·17d. p.ct., being a reduction of a little over 1s. p.ct. on the previous week.

The feature of the Foreign Exchange Market was the weakness of the dollar-sterling, which was attributed to the deadlock between the mine owners and men. The rate dropped to 4.85⅜ on Friday, but rallied slightly on Saturday. French francs closed at 103.02, Belgian francs at 105.12, and Italian lire at 132½. All the "Neutral" exchanges moved against this country.

The Silver market was quiet but steady, the cash price being 32d. per oz. Gold remained unchanged at 84s. 10½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on March 5. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. July 24.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C.	77—80	..	..
295,492	,,	,,	4	4	Do. 4 p.c. Pref.	71—76	..	..
1,551,868	,,	Apl. 2	6½	6½	Alliance & Dublin Ord.	63—68	..	63—65
374,000	,,	July 9	4	4	Do. 4 p.c. Deb.	60—65	..	..
300,000	1	May 7	1/7½	1/7½	Bombay, Ltd.	1 1/16—1 1/16	..	19/0
170,000	10	Mar. 5	8½	8½	Bournemouth 5 p.c.	12—13	..	..
425,050	10	,,	7	7	Do. B 7 p.c.	12½—12¾	..	..
150,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	..
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb.	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	77—80	..	..
992,045	,,	July 9	6 3/16	6 3/16	Brentford A Con.	93—98	+1	96
990,500	,,	,,	6¼	6¼	Do. B New	93—98	+2	94
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	93—96*	..	..
306,690	,,	June 11	4	4	Do. 4 p.c. Deb.	75—80	..	..
181,337	,,	,,	6	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Mar. 5	12½	12½	Brighton & Hove Orig.	165—170	..	..
244,200	,,	,,	8¾	9¼	Do. A Ord.	122—125	..	..
1,287,500	,,	Feb. 19	5	5	Bristol 5 p.c. max.	96½—97 1/16 a	..	..
855,000	,,	Mar. 19	8	7	British Ord.	104—109	−1	105—105½
100,000	,,	June 25	7	7	Do. 7 p.c. Pref.	120—125	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—76	..	..
100,000	10	May 21	6	8	Cape Town, Ltd.	5½—6½	−⅛	7—7⅛
100,000	10	Apl. 23	4½	4½	Do. 4½ p.c. Pref.	6—7	..	5½—6 3/32
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb.	69—74	..	..
626,860	,,	July 23	6	6	Cardiff Con. Ord.	98—101*	−3	..
237,860	,,	June 25	7½	7½	Do. 7½ p.c. Red. Deb.	101—104	..	..
157,150	,,	Feb. 19	5	6½	Chester 5 p.c. Ord.	89½—94½ b	..	..
1,513,280	,,	July 23	5/14/8	5⅜	Commercial 4 p.c. Cap.	80—85*	−2	82½—83
560,000	,,	,,	5⅜	5/3/4	Do. 3½ p.c. Cap.	80—85*	−2	82½—84
475,000	,,	June 11	3	3	Do. 3 p.c. Deb.	56—59	..	56½
800,000	,,	14 Jan. 15	—	—	Continental Union, Ltd.	35—40	+3	35—38
200,000	,,	June 11	7	7	Do. 7 p.c. Pref.	85—89	..	..
660,000	,,	Mar. 5	6½	6½	Croydon sliding scale	98—102	..	..
284,975	,,	,,	5	5	Do. max. div.	83—86	..	..
492,270	,,	Feb. 19	6	9	Derby Con.	110—112c	..	..
55,000	,,	Jan. 8	4	4	Do. Deb.	74—76c	..	..
1,002,180	10	July 23	4	6	European, Ltd.	6½—7⅛*	−⅛	7—7 1/16
16,460,070	Stk.	Feb. 19	5½	5½	Gas Light & Coke 4 p.c. Ord.	83—85	+½	83½—84½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	61—64	..	61½—61¼
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	77½
4,761,930	,,	June 11	3	3	Do. 3 p.c. Con. Deb.	58—61	..	..
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Mar. 19	6½	6½	Hastings & St. L. 5 p.c. Conv.	92—97	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	73—78	..	..
70,000	10	May 7	10	10	Hongkong & China, Ltd.	17½—18½	+½	..
86,600	Stk.	Mar. 5	10	10	Hornsey 7 p.c.	136—141	..	..
1,976,000	,,	May 21	10	59	Imperial Continental Cap.	138—143	+1	138—141½
226,170	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	71—74	..	..
235,242	,,	Mar. 19	6½	6½	Lea Bridge 5 p.c. Ord.	96—101	..	..
2,147,340	,,	Feb. 19	5½	5½	Liverpool 5 p.c. Ord.	86—87b	..	..
600,000	,,	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	103½—104½ b	..	..
165,736	,,	Feb. 19	9	8	Maidstone 5 p.c. Cap.	122—132	..	..
63,480	,,	June 25	3	3	Do. 3 p.c. Deb.	55—60	+3	57½—57½
75,000	5	June 25	3	7	Malta & Mediterranean	4—4½	..	..
541,920	Stk.	June 11	4	4	Montevideo, Ltd.	65—69	..	67½
2,061,315	,,	Mar. 5	5	5	Newcastle & Gateshead Con.	69—71d	..	..
300,929	,,	,,	4	4	Do. 4 p.c. Pref.	77—78d	..	..
529,705	,,	June 25	3½	3½	Do. 3½ p.c. Deb.	67½—68½ d	..	..
15,000	,,	Mar. 5	11	12	North Middlesex 10 p.c.	..	..	..
75,940	,,	,,	7 7/16	8⅜	Do. 7 p.c.	..	..	..
300,000	Stk.	May 7	9	7	Oriental, Ltd.	100—105	..	103—104½
188,120	,,	June 25	7⅛	7½	Plym'th & Ston'house 5 p.c.	108—113	..	..
60,000	50	Mar. 5	13	14	Portsea Island B	96—99	..	..
100,000	50	,,	12	13	Do. C	93—98	..	..
2,289,909	1	—	—	—	Primitiva Ord.	8/3—9/3	..	8/3—9/0
302,600	100	June 2	4	4	Do. 4 p.c. Red. Deb.	78—80	..	..
600,000	Stk.	July 23	4	4	Do. 4 p.c. Red. Deb. 1911	62—64*	−2	..
193,744	,,	June 25	4	4	Do. B. Aires 4 p.c. Rd. Db.	63—65	..	..
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	63—65	..	64
150,000	10	Mar. 19	6	6	San Paulo 6 p.c. Pref.	7⅛—8¼	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	42—45	..	..
270,000	Stk.	Mar. 19	5¼	5¼	Sheffield A	104—106e	..	—
419,968	,,	,,	5¼	5¼	Do. B	104—106e	..	—
1,047,000	,,	,,	5¼	5¼	Do. C	104—106e	..	—
90,000	10	June 11	6	4	South African	7—9	..	..
6,609,895	Stk.	Feb 19	5	6¼	South Met. Ord.	91½—93½	..	92½—92½
1,895,445	,,	July 9	3	3	Do. 3 p.c. Deb.	57—60	..	58½—58½
734,000	,,	Mar. 5	6¼	6¼	Do. 6¼ p.c. Red. Deb.	102½—104½	..	103
91,500	,,	Mar. 5	8¼	8¼	South Shields Con.	135—136d	..	..
1,187,795	,,	July 23	6¼	6¼	South Suburban Ord. 5 p.c.	90—95*	..	..
368,837	,,	June 25	5	5	Do. 5 p.c. Deb.	93—96	−2	..
647,740	,,	May 7	5	5	South'mpt'n Ord. 5 p.c. max.	80—83	..	..
121,275	,,	June 25	4	4	Do. 4 p.c. Deb.	70—75	..	..
250,000	,,	Mar. 5	7	7	Swansea 7 p.c. Red. Pref.	102—104	..	..
200,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	101—101½
120,000	,,	July 23	8	7½	Tottenham District A 5 p.c.	113—116*	−3	..
882,275	,,	,,	6¼	3¼	Do. B 3½ p.c.	90—95*	−3	93—95
150,000	,,	July 9	—	28/4	Do. 5½ p.c. Pref.	103—105	..	..
181,255	,,	June 11	4	4	Do. 4 p.c. Deb.	76—79	..	..
258,251	,,	Mar. 19	5	5	Tynemouth Con. and New	74—76d	..	..
					Uxbridge, Maidenhead, &			
197,294	,,	Feb. 19	6½	6½	Wycombe 5 p.c.	95—100	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	95—100	..	..
91,800	,,	,,	—	6½	Do. 5 p.c. Maidenh'd	90—95	..	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 9	9½	8½	Wandsworth A 5 p.c.	127—132	..	..
255,636	,,	,,	7½	7	Do. B 3½ p.c.	107—112	..	..
392,955	,,	,,	6/9/6	5/19/0	Do. C and New	93—96	..	..
352,000	,,	,,	7⅜	6½	Wimbledon 5 p.c.	102—105	..	..
98,000	,,	,,	7⅛	7⅛	Epsom 5 p.c.	109—112	..	..
88,416	,,	June 25	5	5	5 p.c. Deb.	56—59	+1	..

Quotations at :—*a*,—Bristol, *b*,—Liverpool, *c*,—Nottingham. *d*,—Newcastle, *e*,—Sheffield. * Ex; div.

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